

AUTOMOTIVE INDUSTRIES

The **AUTOMOBILE**

Reg. U. S. Pat. Off.
Established 1902

Vol. 63

No. 5

NORMAN G. SHIDLE, Directing Editor

LESLIE PEAT, Managing Editor
P. M. HELDT, Engineering Editor
JOSEPH GESCHELIN, Asso. Eng. Editor
ATHEL F. DENHAM, Field Editor

HAROLD E. HILLMANN, Asst. Editor
HERBERT HOSKING, News Editor
HAROLD M. BAKER, Detroit News Rep.
A. B. CROFOOT, N. Y. News Rep.

Contents

Financing of Wholesale Car Sales Increases Despite Decline in Retail Volume. By A. Burdet Crofoot	145
Individual Shop Study Needed for Rustless Steel Operations. By Joseph Geschelin	148
High-Speed Diesel Engine Development for Automobiles and Aircraft is Leading Topic at Automotive Sessions of World Power Conference	152
Influence of Valve Head Design Needs Study	158
Just Among Ourselves	161
Hesselman Oil Injection Engine Uses Low Compression	162
Fuel Spray Penetration Decreases Under Heat	165
Studebaker-Pierce-Arrow Corp. Offers First Truck Unit	166
Books for the Business Bookshelf	168
New Developments	170
Automotive Oddities	172
News of the Industry	173
Calendar of Events	180
Advertisers' Index	102-103

Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY
Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. G. C. BUZZY, Vice-Pres.
A. H. VAUX, Secretary and Treasurer
JOHN A. CLEMENTS, Asst. Treasurer

JULIAN CHASE, Business Manager
Automotive Industries
Cable Address Autoland, Philadelphia
Telephone Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
Chicago—5 South Wabash Ave., Phone Central 7045
Detroit—710 Stephenson Bldg., Phone Northway 2090
Cleveland—1140 Guardian Bldg., Phone Main 6860
Los Angeles—503 Petroleum Securities Bldg., Phone Westmore 9084

Controlled by United Business Publishers, Inc., 239 West 39th St., New York;
ANDREW C. PEARSON, Chairman, Board of Directors; Fritz J. Frank, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, Mexico, United States Possessions, Canada and all countries in Postal Union, \$3.00 per year; Foreign, \$6.00 per year. Single Copies 35c.

COPYRIGHT, 1930, CHILTON CLASS JOURNAL COMPANY
Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Automotive Industries

DRYING SYSTEMS INC.

Drying and baking equipment for all departments

Automatic Japanning in plant of

DURA CO., Toledo, O.

Two completely mechanized departments producing window channels and regulators are served by a **DRY-SYS** installation for automatic japan dipping and baking.

Each department is served by a monorail loop conveyor system that converges to carry channels, plates and quadrants through a continuous process of washing, rinsing, blow-off, dry-off, japan dipping, dripping and baking.

DRY-SYS engineers are qualified from experience to design and install the drying-baking equipment in your plant.



DRYING SYSTEMS, Inc.

1819 FOSTER AVENUE

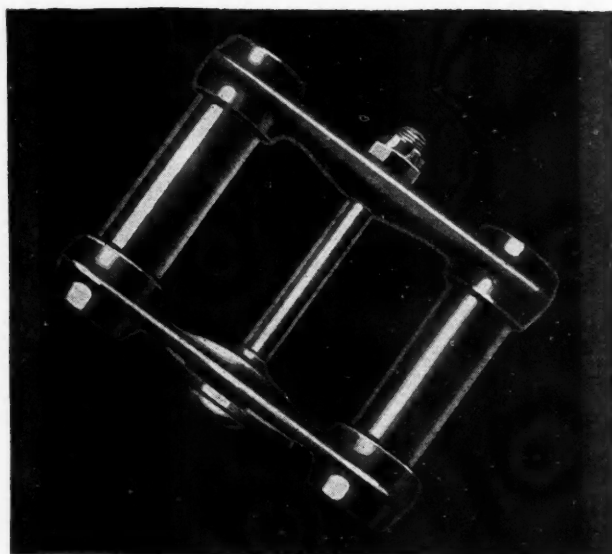
CHICAGO

ILLINOIS

Send us data on the process checked:
☐ Enamel baking
☐ Japan baking
☐ Varnish drying
☐ Core drying

Name _____ Address _____ Town _____ State _____

August 2, 1930



Truon

SPRING SHACKLES

These superior Shackles are standard equipment on 81% of the cars built during the first four months of 1930 by member companies of the N.A.C.C. Car names on request.

Manufacturers: Write at once for full information and quotations.

Sole Licensee:
WILLYS-MORROW CO., INC., ELMIRA, NEW YORK

Financing of Wholesale Car Sales Increases Despite Decline in Retail Volume

Reduction of used car inventories by manufacturers' new "junking" plans will release dealers' capital and local credit structure for new car purchases + + + + +

By A. Burdet Crofoot



Dealers are being carried by finance companies to a greater extent than by local banks

FINANCING of automobile wholesale sales during 1929 showed a greater increase over the previous year than did the financing of retail sales, and this tendency has continued so far during 1930. While accurate figures for the finance companies as a whole are not yet available for 1929, and there is no general comparison between 1929 and 1928, figures compiled by the Department of Commerce for the first four months of 1930 as compared with figures for the corresponding months of last year clearly bear this out.

Unfortunately, no compilation showing the segregation of time sales between retail and wholesale was undertaken before this year, but figures reported by certain representative finance companies show roughly an increase of about 60 per cent in floor plan financing during 1929 as compared with 1928, while retail financing increased approximately 30 per cent. This year, however, the Department of Commerce began making monthly reports classifying the volume of money loaned on time sales as between retail and wholesale. Figures for the first five months of this year show an increase in wholesale financing of 22 per cent as compared with a drop in retail financing of 13 per cent.

If this year were the first to show such a condition, it would appear fairly simple to account for it by saying that fewer cars have been sold at retail this year than last and that on this account dealers have had to go to the finance companies for a larger portion of assistance in carrying their own load. In view of the fact, however, that the conditions that have made for reduced sales this year did not appear until the last two months of last year, which are normally comparatively light retail months, and of the further fact that manufacturers have been gaging their production and wholesale sales closer to retail demand this year than they did last, this explanation, which appears on the surface to be adequate, is seen to be entirely insufficient.

What then has been responsible for the greater increase in wholesale financing than in retail financing? This type of business does not afford the finance companies as wide a margin of profit as is to be found in retail financing, hence the companies cannot be expected to encourage it to the exclusion of the other.

Several possible explanations have been offered, some of which are plausible, and others less likely. One explanation that has been suggested, particularly as applied to last year's experience, is the tendency on the part of manufacturers to force their dealers to take more cars than they can readily sell at retail, causing them to seek aid in carrying their correspondingly heavy inventories. The fact that dealers entered 1930 with heavy inventories following a year of record production would tend to lend weight to this suggestion. Obviously, these heavy inventories had in very many cases to be financed outside the capital of the dealers themselves.

Inventory Financing Less

Doubtless, this fact did contribute heavily during 1929 to the increase in floor plan financing. But it could hardly account for the fact that this type of financing has continued to increase this year in the face of a declining retail financing. Manufacturers have not been producing this year on anything like the scale of their operations of last year, but have been sending dealers just about what they have been able to sell.

Consideration must be given to the fact that dealer stocks of new cars and trucks have been substantially lower this spring than they were last, the decrease perhaps amounting to as much as 25 per cent on May 1. Hence, the money required by dealers to finance their inventories has been materially less this year. Thus the finance companies have been an even more important source of dealer credit than the increase in wholesale financing by itself would indicate. It would appear, therefore, that if this were the sole factor effecting this result, there should have been a decrease in floor plan financing just about proportionate to the decrease in retail financing.

Of course, it might be argued that because of the retardation of retail sales this year and a consequent reduction in retail profits, dealers have had recourse to finance companies to help them carry a greater portion of their new purchases while their own money was tied up in older inventories. This may, to a certain extent, be the case, but it must be borne in mind that finance companies are, after all, bankers, and are loath to put their money into businesses that appear to be in a frozen condition. It would be likely, therefore, that if this fact were to any great extent responsible for the condition under discussion, there would also have been an unusual increase in the amount of paper carried by dealers with their local banks. Although no

figures on this are available, it appears that the exact opposite prevails here. That is, dealers are carried by their local bankers to a less rather than greater extent now than formerly.

Here, perhaps, lies another explanation of the development last year of this tendency. For one thing, during the early part of the year, when Wall Street was drawing all available money to itself with its high interest rates, many local bankers found more profitable places to invest their funds than with local merchants, thus making it necessary for dealers to go to the finance companies to a greater extent than formerly for their financial assistance. Then, too, many of the local bankers realized the condition already mentioned of heavily increasing inventories for the dealers, and probably began to fear that these stocks were not sufficiently liquid. This also forced the dealers to look elsewhere than their own bankers for the necessary money to continue their business.

Of course, inasmuch as banks lend money to finance companies, indirectly they possibly are participating to as great an extent as ever in the financing of automobile distribution. The increased wholesale business of the finance companies, therefore, may mean that for the period of the depression at least, these banks feel that it is better business to loan through an intermediary rather than to lend directly to the dealer.

Used Car Stocks Liquidated

Another factor that may have affected the increase of floor plan financing last year is the very heavy used car stocks that many of the dealers were carrying during a good portion of the year. During the spring and summer of last year many of the dealers found their own capital and a goodly part of their bank credit tied up in used car inventories, with the result that they had to go to finance companies to finance their new car purchases. This would not, however, account for the

Floor plan financing has increased rapidly during the past 18 months in face of a slower increase in 1929 retail financing and an actual decline this year + + + +



continued increase this year. Used car stocks have been fairly well liquidated this year, and the dealers' local resources are no longer so heavily tied up in this way as they were a year ago.

An executive of one of the large finance companies has suggested that the fact that many new model announcements were postponed until nearly the first of the year 1929 caused prospective buyers to hold off until then, with the result that dealers entered the year with heavier inventories than usual and had to receive financial aid in stocking up on their stocks of the new models. Then before the year was over the stock market trouble started and buying was poor, with the result that dealers again had to look to the finance companies for assistance in purchasing stocks that were being sent them by the manufacturers.

Junking Plans Will Help

It is quite probable that all of these facts have had a bearing on increasing the volume of floor plan financing to the extent that has occurred. If these are the only causes that have led to this result, it seems safe to assume that the condition referred to will be temporary—a condition much desired by the finance companies. In the first place, nobody looks for the present business situation to continue indefinitely, and when improvement does come, dealers will sell cars faster and reduce inventories to a greater extent. This will place them in a better position with relation to their local banks, which will open up their facilities more readily. Both of these facts should result in reduction of the volume of motor lien wholesale paper carried by the finance companies.

If the used car junking plan now adopted by the majority of manufacturers results in the end sought, there should come about as a by-product a reduction in used car inventories carried by dealers, releasing more of their own funds and local credit facilities for the



Automotive Industries

Continued gaging of production to sales should relieve the dealer's financial load and reduce his calls to the finance company for wholesale liens + + + + +

Wholesale and Retail Financing

1929

Jan.	Wholesale. \$35,888,000	██████████
	Retail 48,677,000	██████████
Feb.	Wholesale. 47,919,000	██████████
	Retail 61,736,000	██████████
Mar.	Wholesale. 61,097,000	██████████
	Retail 96,639,000	██████████
Apr.	Wholesale.. 74,714,000	██████████
	Retail 116,811,000	██████████

1930

Jan.	Wholesale. \$52,351,000	██████████
	Retail 49,968,000	██████████
Feb.	Wholesale. 61,153,000	██████████
	Retail 52,802,000	██████████
Mar.	Wholesale. 76,467,000	██████████
	Retail 76,527,000	██████████
Apr.	Wholesale. 84,064,000	██████████
	Retail 92,852,000	██████████

Chart and data from the N.A.F.C. Bulletin

carrying of new stocks. Further, if the manufacturers continue the policy they are employing this year of gaging production to sales rather than hoping to sell all they can produce, dealers should remain in a more liquid position, again resulting in lower demands to finance companies to finance their floor plans.

On the other hand, if manufacturers, as soon as the present sales situation shows signs of relief, revert to their old policy of demanding that dealers dispose of all they can produce, we may reasonably expect to see a continued advance in floor plan financing. To this extent solution of the problem lies up to the manufacturer. To those manufacturers who have their own finance companies, therefore, this situation presents a real direct problem, affecting their own income.

Should the condition continue, what steps will be taken to correct it? There seems to be only one step possible. Finance companies will increase their charges for floor plan financing, in order to equalize their income from this type of business with their retail business. This might be expected to result in the driving of more dealers to seek greater credit lines with their local banks. What the ultimate result can be, none can foretell.

August 2, 1930



Individual Shop Study

Problems require closer cooperation between engineering and production departments during initial research

By Joseph Geschelin

PREDICTIONS that the potentiality and extension in the use of rustless steel for decorative parts of automobiles will be realized sooner through the cooperation of engineering research with the production department are voiced by a number of unusually well-informed people. Needless to say, an outstanding example of this is the progress made by Ford engineers, as told in *Automotive Industries*, July 12, 1930.

Evidence of definitely new problems connected with press shop operations and the polishing of finished parts further strenghtens the suggestion that the problem demands a preliminary study before it is turned over to the production department. And in order to provide field experience for such studies the following survey was undertaken. Naturally at this stage of development there is practically no standardization and no definite trend of practice. Nevertheless, a number of basic facts are already known about the behavior of rustless steel and methods employed in fabricating it.

Rustless steel, commonly known as 18-8 and marketed under a number of distinctive trade names, is available in strip and large sheets for stamping purposes. Both strip and sheet are available in a pickle finish, or a full polished finish depending upon requirements.

Based upon facts to be discussed later, problems concerned with the utilization of rustless steel sheets may be divided broadly into two major classifications: (a) Those concerned with light stamping; (b) Those concerned with deep drawn stamping. When examined in detail, these in turn are affected by the volume of production.

Intimately related to the drawing process are the problems of die design, materials for dies and punches, and special drawing lubricants.

Orthodox polishing methods are inadequate. New polishing materials, polishing tools, and automatic equipment, as well as an entirely different technique, must be utilized in order to produce the desired finish. The same problem in other industries is simpler because the standards of acceptance are different, the character of the finish being secondary to other qualities.

According to Parmiter the chemical composition of the rustless steel sheet is about as follows: Chromium, 18 per cent; nickel, 8 per cent; carbon, 0.15 per cent. For the physical properties he gives values for yield point—36,300 lb. per sq. in.; tensile strength, 120,960 lb. per sq. in.; elongation, 65 per cent; for soft, annealed sheet; with a Brinell hardness ranging about 130 minimum. Although this material cannot be hardened by heat treatment, hardness as high as 400 Brinell may be produced by severe cold working. However, regardless of the degree of cold working, the stamping can be brought back to a soft, annealed state by quick cooling in air from a temperature of about 2100 deg. Fahr. In his paper, "High Chromium Steels," Parmiter gives the following table showing changes in physical properties due to varying degrees of cold working, as represented by the Brinell hardness number. Thus the necessity for annealing after a severe drawing operation is made apparent:

Y.P. Lb. Per Sq. In.	T.S. Lb. Per Sq. In.	Elong. Per Cent in 2 In.	Brinell Hardness
59,900	142,460	47.0	190
112,850	165,540	32.5	303
169,570	215,040	13.0	352

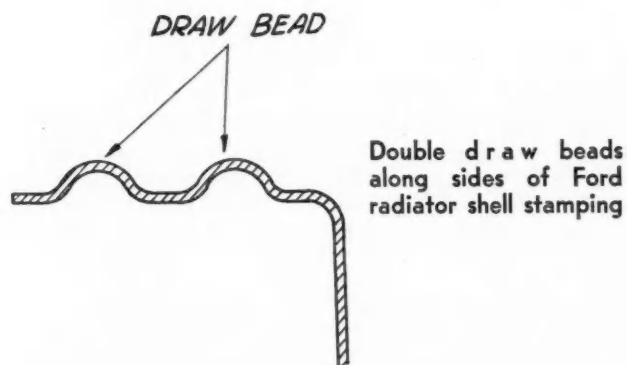
The consensus of opinion is that in the annealed state rustless steel possesses drawing properties far superior to mild sheet steel, since ductility is about 15 to 20 per cent greater; on the other hand, ductility decreases rapidly during the cold working operation. In general this material requires a greater application of force to deform, and is abrasive in action on the dies. In fact this latter condition is so serious that

Needed for Rustless Steel Operations

a special drawing lubricant is required to preserve the life of the die. Another means of prolonging the life of the die is to provide greater clearance between the punch and die; Ford makes this 0.007 in. greater than customary practice and allows an additional 3/32 in. clearance at the two shoulders of the radiator shell, where the greatest amount of drawing takes place. This was necessitated by the observation that rustless steel has an inordinate tendency to stretch, and ample clearance space must be provided if wrinkling and buckling are to be prevented.

Although the general principles of die design prevail, it must not be concluded that the same dies or similar die construction may be used interchangeably for both mild steel and rustless steel. A certain amount of divergence exists due to peculiarities in behavior of rustless steel, which perhaps are not so apparent in light stamping as in deep-drawn work.

For instance, Winlock and Kelley point out that the allowance for spring back in the design of the die



must be varied in accordance with the yield point of the sheet being greater for higher values. Yield point for mild steel ranges around 25,000 lb. per sq. in., and may approach 55,000 lb. per sq. in., whereas rustless steel ranges from 33,000 lb. per sq. in. for the soft annealed sheets, up to 66,000 lb. per sq. in.

Among other things, Ford engineers have found that the drawing surfaces of dies must be absolutely smooth and free from imperfection, since the action of rustless steel is so abrasive that these imperfections will induce rapidly accelerated scoring. Accordingly they have found it advisable to finish all drawing surfaces with a stone instead of an emery polishing wheel.

Although the form and size of the blank follow customary practice, some modification is necessary. Because of the higher tensile strength of rustless steel, considerably more pressure is required to distort it and consequently, the blank must be more firmly anchored than usual. In making the Ford radiator shell it has been found necessary to employ double draw beads extending partly along the sides of the shell. The length and arrangement of these draw beads is critical and requires considerable experimental work for their determination. Manufacturers of smaller parts, such as hub caps, also report that they use a slightly larger blank, undoubtedly to provide a greater bearing area.

The number of deep-drawing operations depends entirely upon the size and shape of the piece, and the gage of the sheet. Lalance & Grosjean, manufacturers of Crusader ware, spent about 10 months experimenting with die designs before shifting to rustless steel production. In their opinion, rustless steel vessels of the same size as mild steel require more drawing operations, the ratio being about 5 to 3. They have been very successful in building large vessels, the latest



one being 10 in. diameter, 18 in. deep, of 18-gage rustless steel. This vessel requires five draws and six annealing operations. The Columbian Enameling & Stamping Co., another prominent manufacturer of rustless steel kitchenware, reports making vessels 12 in. diameter and 13 in. deep, of 16-gage, requiring four drawing operations and five anneals.

Special Materials for Deep-Drawing

For all deep-drawing operations it is agreed that special materials are necessary for the die, draw-ring and punches. Experiments with bronze rings and inserts have shown excellent results and Transue & Williams report that this material withstands the severe abrasive action of rustless steel sufficiently to eliminate drag marks in the finished piece. However, the possible advantages of bronze are more than offset by its prohibitive cost and cast iron of special analysis and heat treatment is found to answer the purpose. For the draw-rings and dies used in the production of Ford radiator shells, cast iron of close grain having the following specifications is used: Carbon, 3.25; manganese, 0.45; chrome, 0.70; nickel, 2.0; silicon 1.25. After the machining the finished part is heated to 1550 deg. Fahr., quenched in oil, reheated to 900 deg. Fahr. and cooled in air.

The Brinell hardness is between 286 and 321. Punches used in rustless steel deep-drawing operations take severe punishment and should be made of one of the special high-chrome or other alloy steels marketed by the various steel manufacturers.

Choice of the proper drawing lubricant is found to depend upon a number of variables, some of which are as follows:

1. Gage of metal.
2. Size of stamping.
3. Routing of operations.

Indeed the latter condition in itself involves a number of variables. For example, where a stamping undergoes a number of deep-drawing operations with anneals between operations, the drawing lubricant must be water soluble or soluble in an alkaline solution, to permit its complete removal prior to pickling. On the other hand, in the Ford press shop where no anneals are necessary, the lubricant is left on and serves for the polishing operation.

The Columbian Enameling & Stamping Co. uses a lubricant made of a 50-50 mixture of engine oil and Houghton ABC base. Eaton Axle uses a soluble oil, or white lead compound, while some of the steel manufacturers recommend a lubricant composed of 50-50 proportions of linseed oil and powdered sulphur. It is evident, therefore, that the selection of the lubricant depends entirely upon local conditions and must be studied as an individual problem.

Pickling is essential in all deep-drawing processes with anneals between operations. It is inescapable in rustless steel operations because the sheet scales badly at the annealing temperatures which range between 1900 and 2100 deg. Fahr. Moreover, the scale is highly abrasive and will ruin the dies unless it is positively removed. Depending upon operating conditions, pickling may be necessary after each annealing operation or at least after each second annealing operation. The following routing seems to be generally used with some modifications:

1. Dip in a solution of muriatic acid to remove scale.
2. Rinse in hot or cold water.
3. Dip in solution of muriatic acid.
4. Scrub and wash in cold or hot water.

Prior to the pickling operation, the lubricant must be entirely removed as the pickling acids have no effect on greases, oils or lubricants. Pickling acids, temperature of the bath, and the use of inhibitors or catalyzers, have been so well standardized that it is unnecessary to go much more into detail here.

Polishing Distinctly Technical

Polishing of rustless steel parts is distinctly a technical problem demanding engineering research. According to Bradford R. Divine, the following are some of the prerequisites of successful polishing: 1—Initial design of the stamping; 2—Proper relation of preceding operations to the polishing operations; 3—Absence of vibration in the polishing department and the polishing machines; 4—Proper selection of polishing machines and polishing tools; 5—Use of automatic polishing machines; 6—Proper selection of abrasives; 7—Proper selection and correct use of glue. In fact, Divine suggests that glue is one of the most important elements of a polishing process since it controls the life and quality of the polishing wheel, and in turn the quality of the polishing job.

One of the important facts developed by experience with rustless steel lies in the selection of the finish of



the sheet. For simple operations involving a single draw without a subsequent anneal, it is desirable to use a polished sheet; for all other conditions the pickled sheet is used since annealing operations will destroy the original polish.

Divine recommends a large wheel with a wide face, first for economy, and second because the larger area dissipates heat more rapidly and will provide a cooler grinding surface. Others recommend cushion-type ventilated wheels, the consensus being that it is desirable to have wheels with some degree of flexibility to accommodate imperfections in the surface of the stamping.

Selection of Abrasive

The type of abrasive, proper selection of grain sizes and their progression, are all of vital importance. For one thing, manufactured grains appear to be preferred to emery because they are more uniform in size and structure. Although it is necessary to start with a coarse-grain wheel in order to remove drag marks and imperfections in the stamping, it is advisable to use as fine a grain as practicable, since the coarse-grain wheel will itself introduce marks that are difficult to remove. Eaton reports that they produce a good job with the following routing: 140-grain emery; 180-grain emery; a flour; a buff with stainless steel compound (commercially available), and a final wiping with dry buff. Kitchenware manufacturers use much coarser grain, ranging from 40 to 120, but their requirements as to luster are not comparable to the demands imposed upon the automotive product.

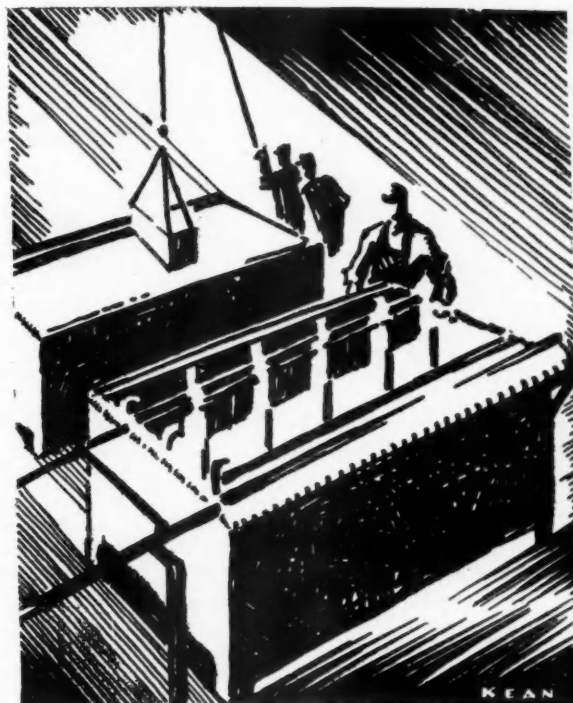
It is agreed that in the polishing operations the stamping should be lubricated and wheels constantly dressed with a soft grease stick. A stick composed of a grease of high melting point and preferably one having a stearic base is recommended. The speed of the polishing wheels should range approximately 6500 to 8500 ft. per minute.

Mild Steel Process Similar

Generalizing briefly, and taking into account possible modification, it can be said that for small, light stampings the procedure may be the same as for mild steel and the press equipment may be used interchangeably. If a high degree of luster is desired, initially polished strip or sheet should be used although it may require a simple polishing and buffing operation to remove slight surface imperfections.

For the larger stamping, modifications in die design and die materials are essential, the degree of variance from mild steel depending entirely upon the thickness of the sheet, the size and shape of the stamping, and local conditions. Where a number of deep-drawing operations are necessary it is desirable to anneal between each operation, the annealing in turn necessitating pickling for the removal of scale.

Manifestly the success of the rustless steel deep-drawing process, so far as output and economy are concerned, is entirely dependent upon initial research



work. Quite definitely then, it is a problem requiring close cooperation between production and engineering research.

Acknowledgments

Transue & Williams Steel Forging Corp.
Lelance & Grosjean Mfg. Co.
Columbian Enameling & Stamping Co.
The Eaton Axle & Spring Co.
Ludlum Steel Co.
American Stainless Steel Co.
Ford Motor Co.
Krupp Niosta Co., Inc.
Wells & Wells, Inc.
Firth-Sterling Steel Co.
Associated Alloy Steel Co.
The Carpenter Steel Co.
Bradford R. Divine, president, Divine Mfg. Co.
Owen K. Parmiter, metallurgical engineer, Firth-Sterling Steel Co., for reading original manuscript.

Bibliography

- "High Chromium Steels," A.S.S.T. Transactions, by Owen K. Parmiter.
- "The Use and Treatment of Glue for Polishing," Second Edition, by Bradford R. Divine.
- "The Prerequisites of Successful Polishing," A.S.M.E. paper, by Bradford R. Divine.
- "Modern Pickling," Mesta Machine Co.
- "Success of Deep Drawing Operations on Strip and Sheet Steel Depends Upon Microstructure," by Joseph Winlock and Dr. Geo. L. Kelley, Automotive Industries, Feb. 15, 1930.

High-Speed Diesel Engine Development Is Leading Topic at Automotive Sessions

ALTHOUGH the subjects discussed at the Second World Power Conference, held in Berlin June 15-25, related chiefly to problems connected with the generation of power in large stationary plants, and its distribution, a number of papers dealing with small units on motor vehicles and aircraft also were on the program, and the conference therefore had a certain automotive interest.

This Second World Power Conference followed the first one at an interval of six years. The first, held in England in 1924, was organized chiefly with the object of attracting engineers and industrialists from all parts of the world to the British Empire Exhibition, which was then being held at Wembley. The scheme proved a success, and it was therefore decided to establish the conference on a permanent basis.

Approximately 4000 delegates, representing 51 nations, took part in the conference in Berlin, substantially one-half of these being Germans. The United States was represented by 159, the American delegation being exceeded in numbers only by those from Great Britain and Japan. A reception was tendered the delegates in the Reichstag Building on Sunday evening, June 15. There the new president, Dr. Oskar von Miller, took over the duties of office from his predecessor, the Earl of Derby, and addresses of welcome were made by high officials, including Chancellor von Bruening.

The actual work of the conference began with a meeting on Monday morning at the State Opera House. With the object of overcoming the language difficulty, always present at international meetings of this sort, a novel system was tried out at the conference. English, German and French were the three official languages. On the stage, each speaker spoke into a microphone, as is now customary at all meetings in large halls. From this microphone there were connections to a number of headphones at interpreters' tables. These headphones were connected with microphones into which the interpreters spoke, the

instruments being provided with soft rubber mouthpieces which made it possible for the interpreters to carry out their work without disturbing each other or the speaker. At each seat in the auditorium there was also a headphone, a selective switch enabling the occupant to select whatever language he desired, and a volume-control switch.

Papers prepared for the conference, which were in one or the other of the three official languages, were not read at the sessions. Each session, as a rule, was devoted to one major subject, and a general report on this subject, summarizing the contents of the various papers contributed on it, was read. However, in the discussion following the reading of the report direct references were made to the contents of individual papers.

One session was devoted to Aircraft and Automobile Engines, but it was admitted that great difficulty had been experienced in securing papers on aircraft engines. In the opinion of the author of the official report, Director Brandenburg, this was due to two reasons, one being the rapid development in aircraft engine design and the other the fact that in most countries aircraft development is under the direct control of the governments. In Germany, owing to the provisions of the Treaty of Versailles, this relationship does not exist, aircraft research and development being carried on by the German Experimental Institute of Aerial Navigation and the Society for Aeronautics, whose work is carried on publicly.

It was stated in this report that excellent progress had been made in increasing the weight efficiency of air engines, engines of from 0.6 to 1 lb. per horsepower now being available in large sizes, but that it was rather difficult to judge the progress toward increased reliability. Perhaps this feature had been neglected because of efforts at weight reduction. Kamm had emphasized that reliability was of greater importance than minimum weight and had laid down the rule that the continuous engine loading should not exceed one-half its peak load. Two timely topics of

for Automobiles and Aircraft of World Power Conference

Reliability of airplane powerplants has been overshadowed by efforts at weight reduction in Europe, according to convention report

Approximately 4000 delegates, representing 51 nations, attended the World Power Conference in Berlin last month.

The United States was represented by 159, being exceeded in numbers by Great Britain and Japan.

The vast detail of the reports, surveys and discussions, gathered at the conference by Edwin P. A. Heinze, correspondent of Automotive Industries at Berlin, were abstracted by P. M. Heldt in the accompanying article.

aircraft power development, namely, the use of high-boiling-point cooling liquids and adaptation of Diesel engines, were also referred to, but nothing new was brought out under these headings. Finally it was recommended to aim at higher thermal efficiency, either by filling the cylinders only partly with fresh charge (super-dimensioned engines), or by utilizing the exhaust gases in turbines.

Dr. Heller, author of the general report on automobile engines, dwelt at some length on the fuel problem. Since there are now more than 30 million motor vehicles in service in the world, the future fuel supply is a problem of prime importance. For the carburetor-type engine light, volatile fuels are required, and these may be either of mineral or vegetable origin. Certain specialists are of opinion that a large part of the demand can be satisfied in the future with alcohol cheaply produced from waste sulphite liquor. In countries with large wood supplies the producer gas system offers economic advantages.

Dr. Ing. A. A. Herzfeld of Austria discussed Motor Vehicle Types and Fuel and Their Further Development. This paper dealt to a considerable extent with the phenomenon of detonation and with anti-detonants. In Austria the demand for non-detonating fuels has begun only recently, but it is growing rapidly. This is

due partly to the fact that practically no cracked gasoline is being used. Of the total imports of gasoline into Austria in 1928, 84 per cent came from Rumania, eight per cent from Russia, four per cent from Poland and the rest from extra European countries. Owing to the low anti-detonating value of the gasoline marketed it had become customary by the middle of 1929 to add from 10 to 12 per cent of benzol. A distributing organization for gasoline-benzol blends was built up during the past year. The author also discussed alcohol mixtures, and there seems to be a desire in Austria to introduce the use of mixtures of gasoline with absolute alcohol, in order to help agriculture.

A report on the economics of high-speed Diesel engines in transport vehicles was made by Dipl.-Ing. F. Schultz and associates of Germany. It was pointed out that application of such engines to motor trucks was rendered difficult by the fact that these vehicles themselves developed at a rapid rate with respect to maximum speed, acceleration and low idling speeds. This the author said applied also to buses, in the case of which silence and smooth operation were additional requirements.

Nearly all of the high-speed Diesel engines that have been built are capable of running on any of the heavier fuel oils on the market, only a few being limited to special grades. The author pointed out that a saving on fuel cost is relatively much less important in the United States than in the other countries, first because here both gasoline and Diesel fuel cost only between 60 and 70 per cent what they cost in Europe, and, second, because with the higher standard of living in the United States fuel cost is a relatively unimportant item unless the vehicle is being used continually. A curve was given

Diversity in languages at the World Power Conference was overcome by an ingenious telephone broadcast system.

Interpreters translated the speaker's words, over three separate wires, with connections to every delegate's desk, in English, German and French.

The delegate had a choice of three languages or he could listen to the speaker over the conventional amplifying system + +

which indicated that whereas under full load the carburetor engine uses about 20 per cent more fuel (on the weight basis), at 20 per cent load it uses 75 per cent more, hence the gain is relatively more important in vehicles having a low power factor.

Another advantage of the Diesel as a vehicle engine would be that the radius of action with a given fuel supply would be much greater. Partly because of the more economical use of fuel on a weight basis, in a Diesel engine, and partly because of the higher specific gravity of Diesel fuel, the same tanks will give a much greater mileage. It was estimated that with the same tank capacity the increase in fuel radius would be 85 per cent. This particular advantage, of course, is of most importance in connection with aircraft.

UP to the present it has not been possible to obtain higher mean effective pressures in high-speed Diesel engines than 80-85 lb. p. sq. in., without smoky exhaust. The term "high-speed" had not been clearly defined, and the author gave two tables in which he classified engines into low-speed, medium-speed, high-speed and very-high-speed. The limit for the different ranges is set for the value "horsepower times revolutions per minute squared." This value for the high-speed range in one chart varies between 50 and 160 million, while according to the other chart it varies between 60 and 200 million.

Conversion of the Diesel engine into a high-speed machine required a number of improvements in combustion technique. By the use of turbulence, as in the engines of Hesselman, Junkers and M.A.N. or by the use of antechambers, as in the engines of Daimler-Benz, Deutz and M.W.M., together with the use of high-class injection mechanism, speeds of 1000 to 2000 r.p.m. no longer cause any difficulties from the standpoint of combustion. All parts subjected to the gaseous pressures need to be comparatively rigid, and though considerable progress has been made in reducing the reciprocating masses, it is advisable to adopt the six-cylinder construction in order to reduce vibration.

At first some difficulty was experienced in getting high-speed Diesel engines to idle satisfactorily, but today the minimum speeds for vehicle engines are

300-350 r.p.m., which is sufficiently low even for bus engines. Because air and fuel enter the cylinder separately, very high mean effective pressures can be produced at low speeds, which gives the engine the characteristic of great tenacity and also permits of high rates of acceleration.

Most high-speed Diesel engines start directly from cold, while a few use a hot wire ignition plug connected to the battery for a few seconds when starting. The Diesel engine starts with full power in cold weather and a Diesel-engined truck can be driven right off after the engine has been started.

The objection that filling stations for Diesel engines are as yet rather far between was met by the argument that the truck owner looking for economy would undoubtedly put in his own storage tank and buy the gas oil or fuel oil at wholesale prices, and if the truck should have to take on fuel while on a trip, this would not cause any particular difficulty by reason of the wide use of stationary Diesel engines at the present time. In an emergency the Diesel engine can be run on a mixture of gasoline and lubricating oil.

Up to Oct. 1, 1929, 245 Diesel-engined trucks of Arco-Bosch, Daimler-Benz, Deutz, Junkers and M.A.N. make were placed in service in Germany, and 65 abroad, while 230 trucks equipped with engines built by foreign licensees of these firms were in service abroad. The mine and narrow-gage locomotive field seems to have been captured by the Diesel engine far more rapidly than the truck field. Considering only the products of Deutz, Jung, Maffei, M.W.M. and Orenstein & Koppel, in Oct., 1929, there were in service 134 mine locomotives (of which 3 had high-speed engines) and 1748 other locomotives (of which 588 had high-speed engines), making a total of 1882.

The report also contained several tables, one of these giving fuel consumption data on operating cost, and total mileage for 13 actual installations of different kinds.

A NEWER Type of High-Speed Diesel Engine Specially Designed for Use on Vehicles was the title of a paper presented by Dipl.-Ing. G. Jendrassik of Hungary. The author discussed the problem of the high-speed Diesel engine in general and described a type designed by him and manufactured by the old-established firm of Ganz & Company of Budapest. The characteristics of the ignition-chamber type to which this engine belongs were outlined as follows by the author: They are less delicate in operation than engines with direct injection and are able to run on heavier fuels. High injection pressures are not necessary with this type, by reason of the ignition chamber action, which eliminates high stresses in the injection pumps and their drives.

A disadvantages of this type in general is that it cannot be started from cold without the use of auxiliary igniters. For vehicle engines the most suitable type of igniter for starting is the electrically heated coil, because it can be controlled from a distance.

These hot-wire igniters, however, operate under rather unfavorable conditions, because they are usually located inside the ignition chamber, so that they will be sure to be in contact with fuel particles when starting. Therefore, the coils heat to a very high temperature in service, for which reason their life usually is quite short. Difficult starting with engines having an ignition chamber is the result partly of the severe cooling of the charge in the chamber during compression and partly of the fact that the fuel jet soon strikes a cold wall and adheres to same. In the case of cylinders of the dimensions here in question, the loss of heat cannot be made up by increasing the compression pressure, since with increase in compression pressure the heat losses also increase.

The use for starting of an auxiliary injection nozzle injecting directly into the compression chamber has been tried on stationary engines, but is hardly advisable for vehicle engines. A well-known manufacturer of truck-type Diesel engines with auxiliary ignition chamber employs an impulse coupling for the injection pump. At low speeds the injection is effected under spring action, which greatly improves the atomization, but a hot-wire igniter is still required.

IN the Ganz-Jendrassik engine the fuel ejected from the auxiliary ignition chamber by the rise in pressure therein is thrown against a raised impact surface on the piston head, which is said to produce a soup-plate effect and reinforce the fuel-distributing action of the ignition chamber. This reduces the amount of turbulence required in the combustion chamber. The injection pump is not driven directly from the crankshaft but is spring-actuated, the spring being tensioned by the crankshaft and released at the moment of injection by means of a lever and cam. Another weaker spring presses the pump piston against this spring. This construction permits of the use of an injection orifice of considerable diameter. Owing to the effect of the ignition chamber, it is, of course, not necessary to have the same fine atomization as with direct injection; on the other hand, the spring actuation of the pump plunger permits of quite high pump pressures being attained even with a fairly large injection orifice. In an engine with cylinders of 130 cu. in. displacement and designed for 1000 r.p.m. the diameter of the orifice is 0.040 in.; in the case of a cylinder of 200 cu. in. displacement, it is 0.050 in. The spring actuating the injection pump is so adjusted as to create an injection pressure of about 2100 lb. p. sq. in.

With spring-actuation of the pump the fuel delivery is independent of engine speed. Control of the fuel supply is effected by varying the pump stroke. A feature of the engine is the degree to which the specific fuel consumption is independent of the speed. Under full load, for instance, the specific fuel consumption is only 10 per cent greater at 600 than at 900 r.p.m., the speed of maximum economy. Without load the speed can be reduced to 300 r.p.m. without missing. An engine of this type for railcar work, developing 110 hp.

With more than 30,000,000 motor vehicles in service in the world, the problem of future fuel supply was of major importance at the World Power Conference.

Where volatile fuels are required, they may be of vegetable or mineral origin, certain of the specialists finding alcohol produced from waste sulphite liquor a potential source.

Wood and charcoal gas is another possible substitute for mineral gasoline, the conference report indicated + + + + +

at 1000 r.p.m., weighs 30 lb. p. hp. The engine operates with a volumetric compression ratio of 12.4 to 1, corresponding to a compression pressure of about 440 lb. p. sq. in.

To facilitate starting, during the starting operation the inlet valves are allowed to remain on their seats till near the end of the inlet stroke. The result is that there is a strong vacuum in the cylinder when the air begins to flow in. When air thus flows from a region of higher to one of lower pressure its temperature is raised, and this heating of the air facilitates ignition during the first few revolutions. After about 1½ minutes of idling the engine is sufficiently warm to permit regular operation.

NOTES on Some Power Transmission Gear for Locomotives was the title of a paper presented by A. E. L. Chorlton of England. The transmissions referred to were intended for locomotives equipped with Diesel engines. The author, after having had considerable experience in the design of such engines, turned his attention to Diesel locomotives and investigated the various types of transmission that seemed to be available for the purpose. Of the hydraulic transmission he considered the Janney-Williams, the Lentz and the Huwiler as having possibilities, and these were described and illustrated in the paper. The general situation with respect to hydraulic gears was summed up as follows: Most hydraulic gears necessitate mechanical link-drive connections from a jack-shaft to the driving wheels, and a bevel gear to transmit power through the right angle between the longitudinal axis of the engine and the driving axles, and these complications make the gears as expensive as the electric drive. Those which permit the use of independent motors on each driving axle and avoid the necessity for bevel gears and side rods have all the advantages of the electric drive in their adaptability to the characteristics of the Diesel engine and their elimination of the direct transmission of road shocks to the main gear and the engine, but are either definitely unsatisfactory for powers exceeding 500 hp. or are of so experimental a character as to offer in-

In a paper read before the World Power Conference Diplom. Ingenieur F. Schultz stated that there were now 245 motor trucks fitted with heavy oil engines of the Bosch-Arco, Daimler-Benz, Deutz, Junkers and M.A.N. types in operation in Germany, and 230 such vehicles abroad.

In October, 1929, there were no less than 1882 Diesel locomotives, including 134 mine locomotives, in service.

sufficient assurance of the cost of the locomotive being ultimately reduced.

Having decided against the use of an hydraulic transmission, Mr. Chorlton developed a mechanical transmission of the planetary type with multiple disk clutch. Only a single set of five planetaries was provided, the drive being either through these or direct. Reverse was obtained by means of an extra pair of bevel gears, both sets of bevel gears being slid into mesh hydraulically and the friction clutch also being engaged and disengaged hydraulically.

At this stage Mr. Chorlton developed his high-speed oil engine, and the much higher speed greatly improved the possibilities of electric transmission, so all of the latest work has been with that type. Mr. Chorlton pointed out that even though the electric transmission may be of lower efficiency, its ability to change through an infinite number of steps from one tractive effort to another renders it more effective except at a few points. With mechanical transmissions the locomotive is limited by the low points of the speed-tractive effort curves, and it is often impossible to change from one gear ratio to the next even though the full engine power is not being used at the lower speed ratio.

The author mentioned that a new control system for oil-electric motors is now under development. This will load the engine at any particular speed to its full output at that speed, and if it is necessary to limit the torque of the engine at that speed, the amount of fuel injected may be modified to suit. With this type of control, therefore, when the controller is set for an engine speed of 800 r.p.m., the engine will be loaded so as to limit its speed to that value. But if two atomizers in the engine should become fouled, the engine torque would immediately be reduced. Such a reduction in torque would be reflected by a slight drop in engine speed, which would cause an immediate electrical unloading sufficient to maintain the engine speed.

PROFESSOR H. KYRTLUND of Finland presented a paper on Experiences With Power Gases from Wood in Automobiles. The author pointed out that in the first attempts to use producer gas in automobiles hard coal and coke were generally used, but that success was achieved only when a change was made to

charcoal and later to wood. One of the chief reasons for the better results with charcoal and wood is that the low heat conductivity of these materials confines the heat to a smaller radius of action, and the whole mass of the charge is not so highly heated, so gas generation is made in accordance with the varying requirements. Another important improvement was the introduction of the downdraft principle. With this system all of the gases produced by the dry distillation are compelled to pass through the zone of white heat, which results in the decomposition of the tarry impurities, so that the only impurities in the gas finally produced are inorganic ashes and the gas is exceptionally easy to clean. For use on motor vehicles it is necessary not only that the gases be quite clean, but the apparatus must be comparatively simple.

Wood gases have an advantage over gases produced from charcoal in that they contain a larger proportion of hydrogen and of light hydrocarbons (mainly methane), while the charcoal producer gas consists largely of carbon monoxide, which has less fuel value than either hydrogen or methane. Wood has the further advantage of greater cleanliness in handling, and in Finland, at least, wood is available everywhere and the cost of preparing the charcoal is eliminated, hence the cost of a certain number of heat units is less in the form of wood than in the form of charcoal.

It was pointed out that three different generators are in favor in Finland at the present time, viz., the Imbert generator made in France, which has no grate and no refractory lining; the generator developed by Col. J. D. Smith, which is manufactured by the Compound Gas Power Company of Reading, England, in which the cooler surrounds the generating chamber, and the Widegren generator manufactured by Svenska Flaktfabriken in Jonkoping, Sweden, which, unlike the other two, has an interior lining of refractory material.

Tests made with these generators in the laboratory supplying a Chevrolet engine showed that whereas the output with gasoline, using a compression ratio of 4.64:1, was about 30 hp., with wood gas, using the same compression ratio, the output dropped to about 16 hp., while with a compression ratio of 6:1 it rose again to about 22 hp.

Gas generators on motor trucks have been tried out in Finland for a number of different applications. On interurban motor buses they have been quite satisfactory. On urban motor buses their use has not been so satisfactory, because in this service acceleration is an important factor and with the lower output of the engine when supplied with wood gas, this, of course, suffers. Farm tractors in many cases have proved unprofitable in Finland because of the high fuel cost, and it seems that there, too, the gas generator has a promising field.

The economic advantages of the producer system are considerably reduced by the fact that the interior parts of the generator are not very durable, and the amortization on this item of the equipment is quite high. Of about 50 Imbert generators placed in service in Finland the interior parts of a good many of them burned through in from 5000 to 6000 miles, but the author said there were hopes that these parts could be made considerably more durable.

A. L. BIRD, who is connected with the British Marine Oil Engine Association, presented a paper on "Some Characteristics of Nozzles and Sprays for Oil Engines." The earliest experiments were made with continuous flow through nozzles. Some interesting results were obtained by varying the proportion of length to diameter of the nozzles. With certain length/diameter ratios irregularities in the rates of flow were observed which were explained as due to turbulence. The influence of changes in viscosity, brought about by changes in temperature, also was investigated. It was quite apparent that the flow of oil varied between streamline and turbulent flow.

A comparison of the results thus obtained with an injection nozzle with intermittent flow constituted the next step in the investigation. Although, aside from losses due to throttling, the quantities and velocities were not greatly affected, the phenomena were greatly displaced in phase owing to elastic and leakage losses and to details of design.

These investigations were continued with injections into a pressure chamber containing an adjustable piston, which permitted of operating at engine pressures and engine temperatures. Images of the flame could be recorded on a rotating sensitive plate through a window of thick glass in the wall of the chamber. The development of the flame and its extinction under different conditions, delay in injection and ignition, duration of flame and rise of pressure were studied. The effect of the admixture of spent gases with the air of combustion also was studied. It was found that with an increasing amount

of dead gases present the fuel jet penetrated further before becoming ignited and the rate of combustion became lower.

NOTES on Heavy-Oil-Engine Research were contributed by Alan E. L. Chorlton. This was chiefly a review of papers on various phases of Diesel engine research which have been presented to British technical associations, including the Institution of Mechanical Engineers, the Institution of Marine Engineers, the Institution of Engineers and Shipbuilders in Scotland, the Institution of Naval Architects, the Diesel Engine Users Association, the North-East Coast Institution of Engineers and Shipbuilders, the Royal Aeronautical Society, and the Institute of British Foundrymen.

A paper on The Economics of the Diesel Engine was presented by J. Pecirka, of Czechoslovakia. He divided Diesel engines into three classes, viz.: marine, motor vehicle and aircraft, and stationary engines. The reasons which retarded the development of the second type were pointed out, but the belief was expressed that development of the design of this class of engines will lead to such improvement that all other types of drive will be at a disadvantage compared with it. The author's experience seemed to have been largely with large stationary engines, and the detail discussion was limited to that type.

H. S. Rowell and C. G. Williams presented a bibliography on research on light gasoline engines covering the more important papers contributed to meetings of technical associations and to the technical press in England during the past five years.

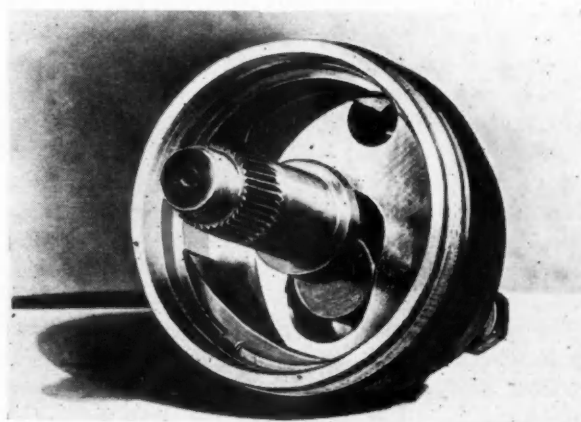
Moto Meter Corp. Develops Hydraulic Shock Absorber

MOTO METER GAUGE & EQUIPMENT CORPORATION has added an hydraulic shock absorber to the other items of its line of automobile equipment. The claim is made for this device that it gives equally effective control throughout the range of spring action.

Referring to the illustration, the instrument is composed of a forged steel cylinder within which there is an elliptical or heart-shaped vane which separates the space within it into two chambers. The vane is adapted to rock around a pin integral with the housing at the circumference, and is moved in the cylinder by an eccentric whose shaft has bearings in the cylinder end walls and projects from one of these end walls, the projecting portion being tapered and serrated to receive the hub of the shock-absorber arm. The eccentric serves to convert the rotary motion of the arm into rotary motion of the vane at a variable ratio, the mechanism being so laid out that the resistance encountered by the vane increases in direct proportion to its angular distance from its normal position.

Thus when there is only slight spring action, as

when traveling over a smooth road, there is comparatively little restraint on the springs, whereas severe deflection of the chassis springs is met by a proportionately heavy resistance.



Moto Meter hydraulic shock absorber with end plate removed
The spaces on opposite sides of the vane are filled with oil which is forced from one chamber to the other through an adjustable passage in the head

Influence of Valve Head Design Needs Study

Relative capacities of poppet valves with flat and conical heads, respectively, have doubtlessly been studied by manufacturers, but no information has been given to engineers

WHILE a tremendous amount of research work has been devoted to practically all details of the internal combustion engines, there are still a number of problems on which additional light is needed. One of these is the relative capacity of poppet valves with flat and conical heads respectively. Theoretically the flat head valve has a greater capacity for a given throat area and a given lift (about 20 per cent more), but this theoretical deduction is based on the assumption that the charge flows parallel to the face of the valve, which is not exactly correct. In flowing through any devious passage like that around a poppet valve head the air or gaseous mixture tends to follow the path of least resistance and hugs the corners to a certain extent. The average path of flow therefore will not be parallel to the face of the valve but will make an angle therewith, approaching the valve face more closely at its large-diameter end. The modification from the theoretical flow, however, is similar in both cases.

Sees Need of Experiments

Another consideration is that in entering and leaving the valve passage the gases are compelled to make a sharper turn in the case of a flathead than in that of a 45-degree conical head valve. It is well known that the curvature of bends or turns is an important factor in resistance to fluid flow, and the comparative cross-sectional areas of the two passages are not the only factor to be considered in comparing the capacities of the two types of valves.

It would seem that this problem of the relative capacities of conical 45-deg. and flat-head valves might well be made the subject of a thorough experimental investigation, as that is really the only way in which it can be solved. It is hardly to be expected that there is a definite relation between the capacities of the two types of valves, but that height of lift, and width of valve seat relative to the throat diameter have an influence. It may even be that the relative capacities vary with the suction, but inasmuch as the theoretical advantage of the flat head is as much as 20 per cent

one would expect a difference sufficiently large to be readily determined by equipment of ordinary sensitivity.

Another somewhat related problem would also bear experimental investigation. As a rule both the inlet and the exhaust valves are made of the same size, partly for the sake of convenience in manufacture, partly because of the advantage of having the valves interchangeable. Both valves, of course, have to pass equal amounts of gas in substantially the same time, but the physical condition of the gas is entirely different during inlet than during exhaust and the methods of setting it into motion also are rather different. In both an L-head engine and a valve-in-head engine the space available for the two valves is practically limited by the cylinder bore. If one of the valves is reduced in size the other can be correspondingly increased without changing the overall dimensions of the engine. The question then is whether the maximum horsepower of the engine can be increased by making the two valves of different diameters, retaining the same combined diameter.

Engines have been built occasionally in which the two valves are of different diameters, and the inlet is then generally made the larger of the two. Whether this practice is based on experimental data or merely on theoretical considerations the writer is unable to say. The aim, of course, always is to get more fresh charge into the cylinders and the most direct way to accomplish this seems to be to enlarge the inlet valves. However, the engine must also be able to clear itself in the time available, for if the pressure in the cylinder is not reduced substantially to atmospheric by the end of the exhaust period, less fresh charge will be taken in, irrespective of the size of the inlet valve. It is conceivable that a change in the diameter of the exhaust valve would have an effect on the life of the valve, for with increasing speed of hot gases past the face of the valve the heating effect certainly would be increased.

Possibly these problems have been fully investigated experimentally by individual manufacturers in connection with the development of new engines, but so far as the writer knows nothing on them has ever appeared in the public prints that was at all conclusive.

Hump Method for Heat-Treating Steel Improved by Controller

Rate of heat absorption by work is held constant beyond critical point by automatic temperature-difference device

AN improvement in the Hump method of heat-treating steel has been made by the Leeds & Northrup Company, Philadelphia, Pa., whereby the rate of temperature rise of the steel is controlled with as great precision after the critical range has been reached as before. Heretofore control was effected by keeping the rate of heat input to the electric furnace constant. Since current is switched on only after the work has attained the same temperature as the furnace, a constant rate of heat input results in a constant rate of temperature rise for both the furnace and the work (up to the critical range), the temperature of the work, of course, lagging behind that of the furnace by a certain time interval.

This parallelism between furnace temperature rise and work temperature rise continues until the work reaches the critical point. From this point on, while the work continues to absorb heat, its temperature no longer rises—until the critical range has been passed. With constant rate of heat supply the temperature of

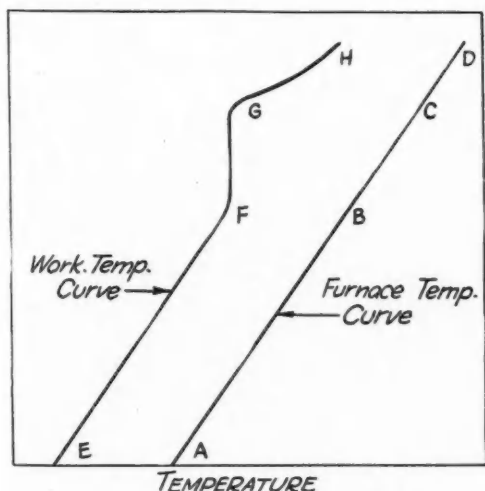
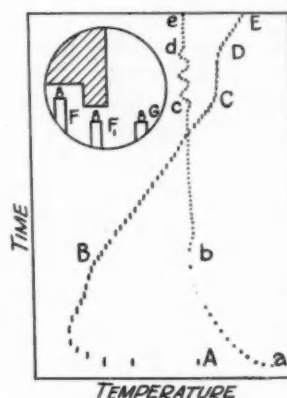


Fig. 1—Temperature variation of furnace and work with constant rate of heat supply to furnace

Automotive Industries

Fig. 2—Location of thermostats with relation to work in temperature difference control system (at F or F, and at G) and curves of temperature work and temperature difference between furnace and work + + + +



the furnace continues to increase, with the result that during and beyond the critical range there is a considerably greater temperature difference between furnace and work than at the beginning of the range. This results in a more rapid heat absorption by the work after the critical range has been reached and a more rapid temperature rise after this range has been passed. The time-temperature relations for both the furnace and the work under these conditions are represented by Fig. 1.

Now, too rapid heating of the work beyond the critical range is about as detrimental as too rapid heating below this range. If the rate of heating is too rapid the heat cannot diffuse sufficiently rapidly throughout the mass of the piece of work; thin sections will heat more rapidly than the heavier sections, and the former, therefore, will be out of the critical range when the latter are still in it. Since the rate of expansion is quite different within and without this range, the difference in expansion of different sections of the same part is likely to cause fracture.

The ideal condition is said to be a constant rate of heat absorption by the work, which calls for a constant temperature difference between furnace and work; to attain this the rate of heat supply to the furnace must be reduced when the work reaches the critical range and increased again when the critical range is passed, so that the furnace temperature curve will parallel the work-temperature curve throughout.

It is possible to maintain a constant temperature

August 2, 1930

difference between furnace and work throughout the heating range by intelligent hand control of the heat input, but control is greatly facilitated and the human element is entirely eliminated by the use of automatic control.

For automatic control two thermo-couples are used, one being placed close to the work and the other in the furnace at some distance from the work, the former responding to the temperature of the work and the latter to that of the furnace. The temperature of the work and the temperature difference between the work and the furnace both are automatically recorded. The same pen is used for making both records, the electrical mechanism operating the pen being connected alternately in circuit with the thermo-couple located at the work and in circuit with both of the thermo-couples which are connected in opposition. The locations of the thermo-couples and the forms of the curves traced are shown in Fig. 2. The temperature curve of the work is substantially the same as in Fig. 1, while the temperature-difference curve is practically a straight line, indicating a constant temperature difference.

The controller can be set for any temperature difference between furnace and work required to give the

desired rate of heating. If the temperature difference becomes greater than that for which the controller is set, the heat input to the furnace is automatically reduced, while if it becomes less, the heat input is increased. When cold work is placed in the hot furnace, both the temperature close to the work and the difference between the temperature of the furnace and the work decrease, the latter because the work increases in temperature and the furnace temperature decreases. From point D where the current is switched on the temperature difference is represented by an almost absolutely straight vertical line, but through the critical range this line shows a number of undulations, indicating that the heat input is being changed or that control is active. Beyond the critical range the temperature difference is kept constant again, until the quenching temperature is reached at point E, to which a temperature difference corresponds.

Holding the temperature difference between work and furnace constant throughout the heating range, the temperature-difference controller assures a uniform rate of heat absorption, which prevents uneven heating of light and heavy sections and consequent spoilage of work.

Intake Muffler Eliminates Power Roar on New Buicks

ONE of the outstanding features of the new Buick models, announced last week in *Automotive Industries*, is the new AC intake muffler and air cleaner, described in our issue of July 19. Further description in connection with the announcement of the Buick models was prevented by lack of space.

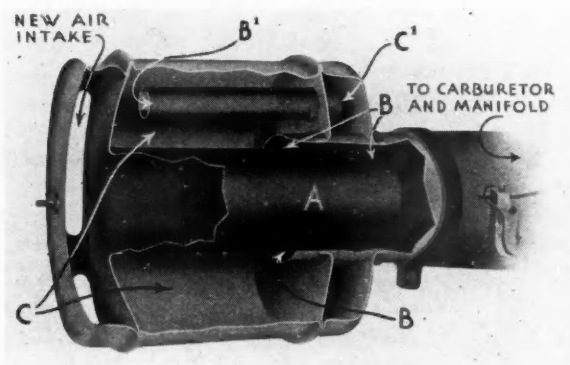
This device, manufactured by the AC Spark Plug Co., Flint, Mich., was designed to prevent "power roar," a phenomenon which has become more noticeable in recent years because of the constant advance in quieting engines in other respects and also by reason of the widespread adoption of eight-cylinder engines.

As far as power roar is concerned an intake manifold acts like a pipe organ. Being of fixed size, it produces air waves of definite length. After the length of this wave has been once determined, it is possible to calculate the required dimensions of a resonator pipe—or, for greater compactness—of a bottle—which when connected to the inlet pipe will break up the vibrations. This bottle is connected to the intake pipe in such a manner that any gaseous vibration originating in the pipe enters the bottle through its neck, passes to the bottom of the bottle, where it is reflected, and reaches the inlet to the bottle again at the very moment the next wave is about to enter. The two waves then cancel each other out.

In the illustration, which shows the Buick application of the AC silencer, A is the air intake, a continuation of the manifold. Around this intake pipe and open toward the manifold is another pipe B rep-

resenting the neck of the bottle mentioned above. This pipe opens into a chamber C representing the bottle proper. By varying the length of the neck of the bottle and the size of chamber C, we can attune the bottle to the characteristic note of the power roar.

Any note, however, in addition to the basic vibration, contains multiples or harmonics thereof, and although these harmonics are of smaller amplitude or volume, it is desirable to provide means for dealing with the most important ones at least. In the AC silencer this is accomplished by providing, in addition to the bottle B, C, an additional bottle, B', C'. The principle of action of this second bottle is the same as that of the first, the only difference being that it is attuned to a wave of different length.



Application of the AC intake muffler and air cleaner to the Buick eights + + +

JUST AMONG OURSELVES

Production Estimates Are Pruned Considerably

WE'VE just been checking back on the estimates we made last December on United States passenger car production for 1930. Unquestionably those estimates need revising today. Along with some of the "best people" in the American business picture we were too optimistic.

Back there in the Hoover-conference era we guessed that United States-Canadian passenger car production would be about 4,100,000 this year. We are now prepared to recant and state that that estimate was high by 500,000 at the very least and possibly by as much as 700,000.

There are some indications now that United States-Canadian passenger car production totals this year may run as low as 3,400,000 and none whatever that they will rise above 3,650,000.

Not Unreasonable to Expect 3,622,000 Cars

PROBABLY the final total will be somewhere between the two figures cited. Which one you choose depends on how you figure. Our statistician, applying the Link relative method to monthly production figures since 1922, comes up with a purely statistical guess of about 3,622,000 as the total passenger cars to be produced in United States and Canada by the end of December. This method, ap-

plied to the figures for the first six months of this year, came within 1.2 per cent of being accurate.

If we do build this total of 3,622,000 cars, it will mean that the last six months of 1930 will run behind the last six months of 1929 by only about 14 per cent, whereas the first six ran behind by something like 31 per cent.

In the light of the nose dive which production did toward the end of 1929 and the indication that general business will start back slowly on the upgrade this fall, such a result does not seem unreasonable to expect.

Difference of Opinion On Truck Probabilities

THE truck picture is a bit more involved, partly because of the uncertainty of the trend of general business and partly because of statistical difficulties inherent in the truck figures.

Certainly our early estimates of United States-Canadian truck output for 1930 were far too high.

Last year truck output ran up to 810,548. The first six months of this year were behind the first six of last year by something like 30 per cent. Individuals within our own organization differ at present on the probable 1930 total. Our own guess is that 650,000 constitutes a slightly optimistic guess.

Low Production Year Weathered With Courage

IN both the passenger car and truck fields, however, funda-

mental trade conditions are more settled, established retailers are less burdened with inventories, and relations between manufacturers and dealers are better than at any time during the last decade.

The entire automotive industry has proved its shock-resisting qualities. It has weathered the worst business depression in years with less difficulty than have many older industries and with a high courage that has increased the respect of every branch of our industry for every other branch.

The automotive industry has proved its ability to use adversity as a purgative and to make a low production year high in confidence and method building qualities.

Replacement Parts Makers Have Economic Stronghold

PARTS makers supplying original equipment to vehicle manufacturers and selling in the replacement field as well still are under fire from their vehicle customers in some instances. Heard another interesting incident of the drama the other day.

Big car maker kept asking one of his important suppliers to get out of replacement end and leave it all to him. Supplier finally said: "Sure, glad to accede to your request. Only thing is you'll have to stand for a 15 per cent increase in price. The price you are paying now is made possible by the fact that I have a good replacement business on which I make a wider margin of profit than I do on the units I sell direct to you for original equipment."

So far as we know this parts maker still sells to this car maker and still is in the replacement field.—N. G. S.

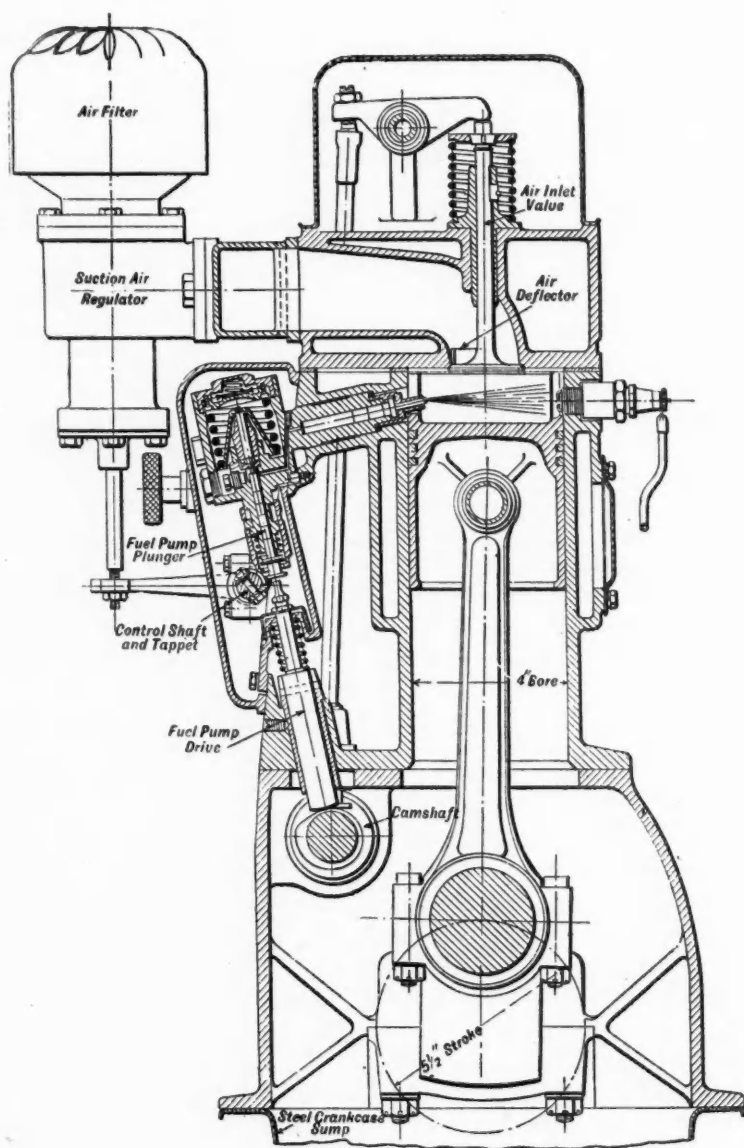


Fig. 1—Cross-section of Hesselman engine and fuel pump

REFERENCE has been made previously in these columns to an oil engine developed by K. J. E. Hesselman of Stockholm. Mr. Hesselman in the past has specialized in Diesel engines, but in this new engine, designed for transportation purposes and therefore operating at high speeds, he has departed from the Diesel principle of compression pressures sufficiently high to fire the charge spontaneously upon the injection of the fuel. The compression ratio is about the same as that normally employed for carburetor-type engines, and ignition is effected by means of a spark plug, but the fuel is injected into the cylinder toward the end of the compression stroke. One advantage of this system is that the working pressures within the cylinder, and, consequently, the bearing loads, are no greater than in a conventional heavy-duty commercial vehicle engine, and except for the

Hesselman Oil

Ratio about the same as that normally employed for the carburetor-type powerplant

Ignition effected by spark plug

fuel injection system practically the same design can be used as for a normal engine. This involves, moreover, that normal engines can be readily converted into oil-burning engines of the Hesselman type. In fact, the engine described in the following is a Scania Vabis truck engine (a Scandinavian make) which has been thus converted. We are indebted for the following particulars regarding this engine and for the drawings accompanying the article to *The Engineer* of London.

This new engine embodies a feature that has been associated with earlier Hesselman engines, namely, an air inlet valve provided with a deflector on the under side of its head, which gives the air entering the compression chamber a swirling motion. It will be seen from the sectional view of the engine that the upper end of the piston is cup-

shaped, the compression space being formed entirely within this cup. The sides of the cup are cut away at two diametrically opposite points, over the injection nozzle and over the spark plug.

No fuel touches the plug, as the two horizontal sprays, which are conical in form, are set each at an angle of 30 deg. to the common axis of the plug and the spray nozzle. The deep hollow crown of the piston is designed to prevent any fuel from being deposited on the walls of the cylinder and thus interfering with the normal lubrication of the liner. As will be seen from the drawing, the spindle of the air inlet valve is positioned by a snug so that the semi-circular shield attached to the inlet valve head gives a definite rotary motion to the entering air. Although there are really two fuel sprays, only one of them has been indicated in the drawing. At full load practically the whole of

Injection Engine Uses Low Compression

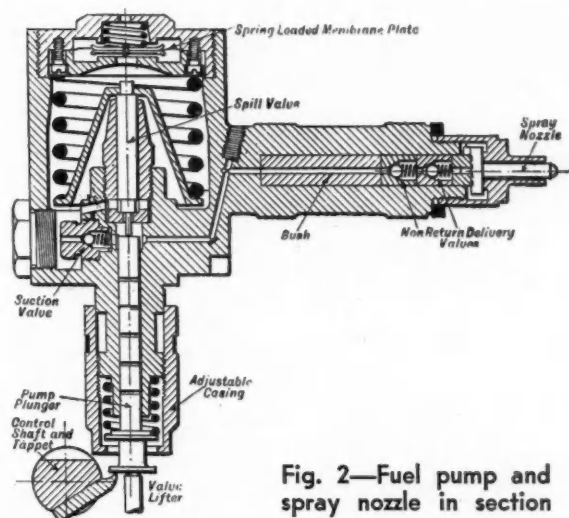


Fig. 2—Fuel pump and spray nozzle in section

the piston area is charged with fuel mixture, which is swept past the points of the spark plug; but at light loads only a part of the area is charged with fuel, and with the smaller supply of air the readily ignitable mixture is in like manner caused to pass in front of the ignition plug, which plug is of the three-point hot-spark type. As shown in Fig. 1, an air regulator is combined with a cleaner and it consists of a spring-loaded throttle valve worked by the lever which operates the fuel pump control shaft.

One of the most important features of the engine is the fuel pump, an enlarged view of which is reproduced in Fig. 2. It will be seen that the fuel pump body is in one piece with the casing for the spray nozzle. By means of the staggered delivery canal the minimum depth from the center of the spray nozzle to the bottom of the pump plunger is obtained. Although the pumps shown in our illustration differ slightly in detail, they all operate in the same manner. They are driven by a spring-loaded push rod or lifter, which is operated from the main camshaft placed within the crankcase. The upper part of the lifter is furnished with a cowl, which is designed to prevent fuel oil from finding its way into the crankcase sump and thereby diluting the lubricating oil.

Both the suction and the two non-return delivery valves consist of hardened steel balls which lie on a hardened and ground conical seating, the springs being suitably chosen for the desired opening pressures. On either side of the delivery valves, as shown above, there are two bushes, which are only provided in order to obviate the drilling of long narrow bore passages. The spray nozzle itself is secured by a removable nut

and the joint between the pump and the cylinder casing is made by a copper ring, the two adjacent pump units being held in position by a steel bridge piece. The lower part of the fuel pump plunger is surrounded by an adjustable casing which, when

screwed up, as shown in the right-hand view reproduced in Fig. 3, brings the end of the plunger quite clear of the valve lifter and the control tappet, thus enabling each pump unit to be inspected and dismantled without altering in any way the control settings for the other cylinders. The left-hand view in the same illustration shows the plunger and control tappet in the light load position. The amount of fuel injected into the cylinder is regulated partly by the control tappet attached to a shaft operated by the acceleration pedal, which also works the air regulator and varies the suction stroke of the pump, and partly by the push rod which, when the plunger reaches the end of its stroke, lifts the spill valve and releases the pressure on the delivery canal, thereby causing the spray instantly to cease without any dribbling effect. The spill valve is loaded with a strong spring so that it will not open at maximum fuel pump pressure, but is only opened when the valve is lifted clear of its seat by the fuel pump plunger at the end of its stroke. In order to prevent vibration and pulsations within the fuel pump owing to the quick starting and stopping of the flow, a spring-loaded membrane plate is fitted at the top of the pump, as shown in Fig. 2, which renders it quiet in operation.

When fitted in the chassis of a truck or car a small auxiliary fuel pump is provided in order to deliver the fuel to the suction side of the pump under a low head. An arrangement is provided whereby any air

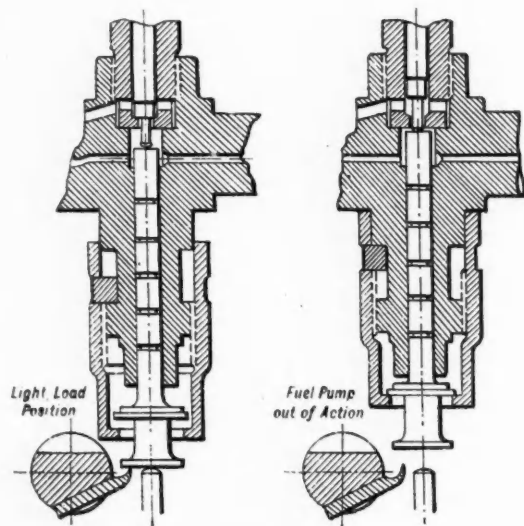


Fig. 3—Hesselman fuel pump adjusting mechanism

bubbles can escape and a filler is also included in the circuit. The fuel pumps are totally inclosed by a light aluminum casing which can be easily removed for pump inspection.

In order to start the engine a small magnetically operated membrane pump worked from the car battery circuit is employed to prime the engine by introducing a few drops of gasoline into the suction inlet. This being done, the engine starts immediately and can be run up to speed with the starting motor or cranked up by hand. As soon as the gasoline is ignited the fuel charge also ignites and no dependence need be placed on the gasoline for warming up the engine. In actual service a small tank holding from 1 to 2 qt. of gasoline has been found to be sufficient for long periods of running.

In Fig. 4 the maximum cylinder pressure, the compression pressure and the brake horsepower are plotted as functions of the brake mean effective pressure. The fuel consumption reaches a minimum value of 0.466 lb. per hp.-hr. when the m.e.p. is about 75 lb. per sq. in. and increases for both lower and higher cylinder pressures. The low compression pressures and the very moderate maximum pressures in the cylinder may be noted.

In the case of a high-speed, high-compression engine of the Diesel type a compression pressure of about 570 lb. per sq. in., with a probable maximum pressure of 850 lb. per sq. in., gives a mean effective pressure of 102 lb. per sq. in., with a thermal efficiency of 30-33 per cent. With the Hesselman engine working with a compression pressure of 114 lb. per sq. in. and a maximum pressure of 425 lb. per sq. in., the same mean effective pressure of 102 lb. per sq. in. is said to have been obtained.

We must confess that it is difficult for us to see how Mr. Hesselman can get as high a thermal efficiency from an engine using 114 lb. compression as from an engine using a compression of 570 lb., since according to one of the fundamental principles of thermodynamics the thermal efficiency increases with the

compression ratio. Moreover, the fact that in operation at part load the air is throttled, would lead one to expect a greater decrease in thermal efficiency with decrease in load than in a Diesel type engine in which the compression is independent of the load.

The Hesselman engine has been taken up in Eng-

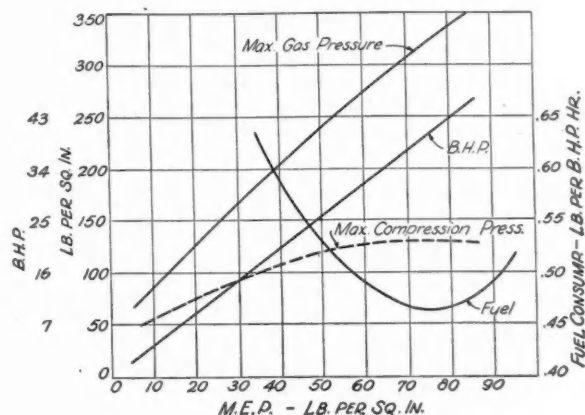


Fig. 4—Variation of compression pressure, maximum cylinder pressure, specific fuel consumption and brake hp. with m.e.p. of Hesselman oil engine + +

land by Oil Motors, Ltd., of London, which has had an experimental engine built at Leyland Motors, Ltd. An engine of the Hesselman type has been built also by the Grazer Waggonfabrik of Graz, Austria.

Study Volume Changes in Metals During Casting

THE American Foundrymen's Association and the Bureau of Standards have been cooperating in a study of the shrinkage of metals during casting and the influence of such shrinkage on the production of sound castings. The first phases of this work were reported at the meeting of the American Foundrymen's Association held in Cleveland, Ohio, recently.

The investigation was divided into two major phases; the first, a study of the volume changes undergone by metals cooling from the liquid state to room temperature, such changes being considered as definite physical properties of the metal quite apart from variables in foundry practice; and the second, a study of the relation of variables in foundry practice to the amount and distribution of the shrinkage cavities or other evidences of volume changes which remain in a finished casting.

THE total length of motor bus lines in Sweden is about 44,000 miles, or four times as great as the railroad trackage in Sweden.

Fuel Spray Penetration Decreases Under Heat

Dispersion increases with heat, N.A.C.A. study of effects of air and fuel oil temperatures shows

Photographic equipment making possible 2000 exposures per second, shows rapid diffusion of spray cloud under high temperatures - - -

A STUDY of the effects of air and fuel-oil temperatures on spray penetration and dispersion has been made for the National Advisory Committee for Aeronautics by A. G. Gelalles of the Langley Memorial Aeronautical Laboratory and is discussed in Technical Note No. 338, of the N.A.C.A.

Fuel oil of a specific gravity of 0.86 at 80 deg. Fahr. was injected into a cylindrical chamber 5½ in. in diameter by 18 in. long, through a discharge orifice in the spray nozzle 0.004 in. in diameter. Injection pressures of 4000, 6000 and 8000 lb. per sq. in. were used. The chamber, which was not completely closed and therefore was at atmospheric pressure, contained air either at atmospheric temperature or heated to 800 or 1100 deg. Fahr. When injected into the heated air the fuel was preheated to 110 deg. Fahr. The air in the chamber was heated electrically to the temperatures mentioned.

The effects on the spray jets were studied by means of the N.A.C.A. spray photography equipment, enabling 2000 exposures per second to be made. At the high air temperatures the spray showed decreased penetration and increased dispersion. These effects are thought to be due to the increase in the oil temperature, in accordance with the findings of Bird (Experiments on Oil Jets and Their Ignition, Proceedings of the Institution of Mechanical Engineers, 1926).

Thus the decreased penetrative power of the spray caused by the increase in fuel temperature more than offsets the decreased resistance of the air caused by the lowering of its density. The spray faded out rapidly at the higher air temperatures, and this is explained by saying that the fuel diffuses rapidly in the surrounding air.

Repeated observations showed that there was no visible ignition until the spray reached the side walls of the chamber. The photographic records showed no flame, although they extended for 0.008 second after

the start of the injection. Only when the fuel particles came close to or actually in contact with the side walls of the chamber did they burst into flame. From the color of the steel walls the temperature there was estimated to be 1400 deg. Fahr. A record obtained with a slow-moving film drum showed the appearance of flame about 0.3 second after the start of injection.

This latter figure bears out the results of Neumann (Experiments on Self-Ignition of Liquid Fuels, N.A.C.A. Technical Memorandum No. 391, 1926), who, from the experimental results of Tauss and Schulte, derived the following expression for t_s , the lowest temperature in deg. Fahr. at which ignition occurs—

$$t_s = C y^{-m} - 460,$$

where C and m are constants which for fuels composed primarily of aliphatic hydrocarbons are given as 819 and 0.16 respectively, and y is the density of the air in lb. p. cu. ft. For the density at a temperature of 1100 deg. Fahr. and atmospheric pressure, t_s is equal to 1010 deg. Fahr., which is about 100 deg. below the temperature indicated in these tests.

Neumann found that for an initial pressure of 8 atmospheres, an ignition temperature of 510 deg. Fahr., and an air temperature of 610 deg. Fahr. the ignition time delay was 0.2 second. Even had the actual temperature of the air been that indicated by the pyrometer-thermocouple unit used in the tests, the ignition delay of 0.3 second was comparable to that obtained by Neumann for the same temperature difference.

In a general way the tests showed that immediately after injection into air at 1100 deg. Fahr., the spray assumed the appearance of a cloud which disappeared from view rapidly. The spray records and curves plotted therefrom show, moreover, that under high temperatures the penetration of the spray is decreased and its dispersion increased.

Studebaker-Pierce-Arrow Corp. Offers

Six-cylinder 70 hp. engine of 205 cu. in. displacement is feature of both 1½ and 2-ton chassis in commercial line
Heavy-duty models to be developed

THE S. P. A. TRUCK CORPORATION, organized to engineer, manufacture and merchandise a complete line of Studebaker and Pierce-Arrow commercial vehicles, announces a new line of Studebaker trucks. Presentation of a Pierce-Arrow heavy-duty line will be made at a later date.

The first units announced are the new Studebaker 1½ and 2-ton trucks. The 1½-ton truck is offered in two wheelbases, 130 and 160 in., the f.o.b. prices being \$695 and \$775 respectively.

The 2-ton truck also is offered in two lengths of wheelbase, 148-in. and 160-in. Prices are \$895 and \$945 respectively. Powerplant specifications are similar to those of the 1½-ton chassis.

Features of the 1½-ton chassis include a six-cylinder 70 hp. truck engine of 205 cu. in. displacement. The fuel system comprises a gasoline pump, 1¼ in. plain-tube carburetor and the Swan-type intake manifold. The crankshaft is carried in four main bearings having a total length of 9 in. Cam and accessory shafts are driven by a silent chain. The accessory shaft carries the generator, distributor and water pump. The deep tubular radiator, together with the rest of the cooling system, has a capacity of 3⅓ gal. At a truck speed of 40 m.p.h. the water is being circulated at the rate of 45 gal. per min. An oil filter is standard. The engine is mounted on four brackets, the front end being cushioned in rubber.

A heavy-duty transmission, with selective sliding

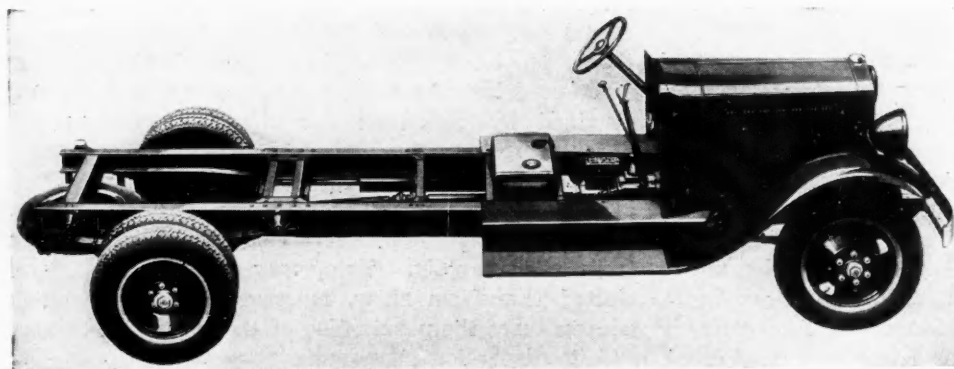
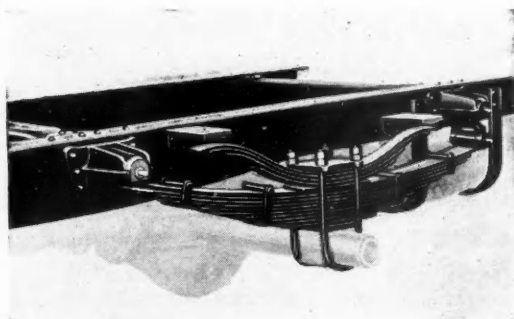
gears, provides four speeds forward and one reverse. Shafts and gears are of alloy steel.

The front axle is of conventional truck design, with Timken bear-

ings on the wheel spindles. The rear axle is a Timken three-quarter floating type with straddle-mounted pinion. A back-up plate keeps the gears in full mesh even under severe strains. The steering gear is the Ross cam-and-lever type. Four-wheel brakes of the Bendix two-shoe type, cable controlled, with molded linings, are standard equipment.

The frame has five cross-members on the 130-in. chassis and seven on the 160-in. chassis. Rear springs are carried on outrigger hangers riveted to the frame. Auxiliary rear springs are available at extra cost on both lengths of the 1½-ton chassis. Single steel wheels are standard equipment on the 1½-ton chassis, dual rear wheels being available at extra cost.

The rear axle is a Timken full floating type, the steering gear the Ross cam-and-lever. There are



An auxiliary type spring is available, at extra cost, on the S.P.A. trucks.

Standard rear springs on the 1½-ton model, are 2½ in. wide and have 10 leaves

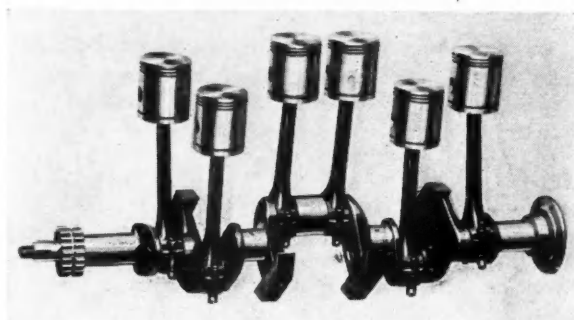
Dual rear wheels are standard equipment on the new 2-ton Studebaker truck +

First Truck Units

six cross-members on the 148-in. wheelbase and seven on the 160-in. wheelbase chassis. Steel wheels (dual rears) are standard equipment. Auxiliary rear springs are optional at extra cost.

Both the 1½ and 2-ton chassis are furnished with steel cowl hood and front fenders. The front bumpers are chromium-plated single bars, 5 in. wide. In addition to the instrument panel, which carries a speedometer, an ammeter, a gasoline gage, an oil-pressure gage and an engine-temperature indicator, the combination ignition switch and light controls are mounted on the dash. An auxiliary foot-button light control enables the driver to change headlights from long to short range without removing his hands from the steering wheel.

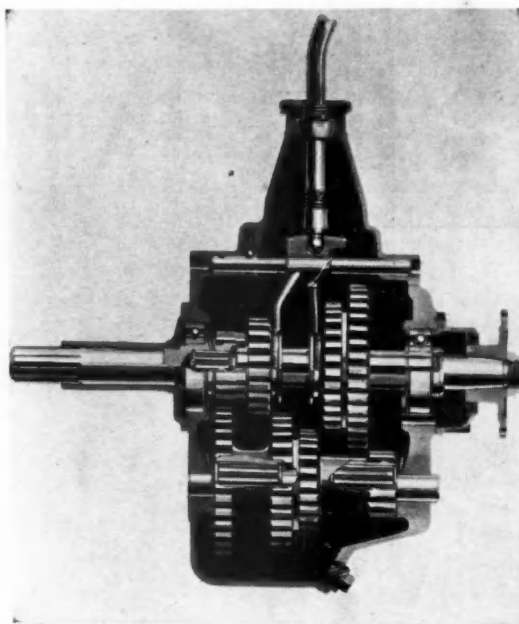
De luxe all-weather cabs are offered on both chassis. Special attention has been given to the driver's com-



Crankshafts of both the 1½ and 2-ton Studebaker trucks are statically and dynamically balanced. Cast-iron pistons are matched in sets to insure balance + + + +

The Studebaker trucks are powered with a six-cylinder engine of 205 cu. in. displacement, developing 70 hp.

Automotive Industries

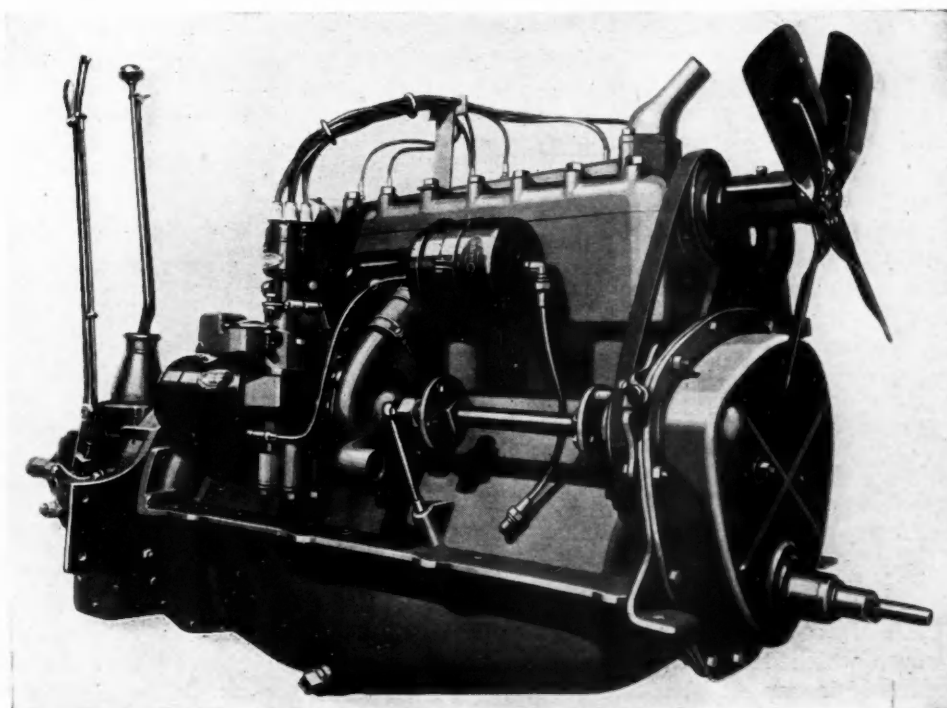


Heavy-duty four-speed transmission used on the Studebaker trucks

fort and convenience. The doors are 28½ in. wide, with 23-in. windows which drop flush with the sills. The rear window is 25⅝ in. wide. Narrow steel pillars give full vision for the driver. The seats are comfortably upholstered and there is more than the usual amount of leg room.

All standard body-types are available with both chassis, including panel, screen, express, stake, canopy, grain, cattle and dump bodies.

In addition to the 1½ and 2-ton chassis just announced, larger truck units to be manufactured under the Pierce-Arrow name will be announced later.



August 2, 1930

Books for the Business

Simplified Aerodynamics

By Alexander Klemin, Professor Aeronautical Engineering, New York University. Published by the Goodheart-Willcox Co., Inc., Chicago.

AS the title implies, the principles of aerodynamics are explained in this book so they can be understood by readers who have not had the advantage of a college education. The author does not avoid mathematics, but the mathematics used is only of the simplest, and the most frequently used algebraic and trigonometrical functions are fully explained. The application of trigonometry in aerodynamics is illustrated by the problem of the composition of velocities in the case of an airplane traveling in a side wind and that of the composition of the total force on the airfoil into lift and drag. In the second chapter the properties of the air and atmosphere are dealt with, the variations of pressure and temperature on the density of the air being explained, and this is naturally followed by a discussion of the effect of variations in atmospheric density on engine power. In succeeding chapters the entire field of aerodynamics is covered in the same simple manner. Each chapter is followed by a number of problems relating to the subject discussed in the chapter. The answer to the problem is invariably given and in some cases it is worked out in detail. The author says that in his many years of teaching he has found that it is possible for a student to listen to a lecture or to read a book and yet to grasp the subject only in appearance. The ability to work out examples relating to the subject in hand is undoubtedly the best proof that the student has grasped it.

Das Trolleybus System

By L. Betz. Published by M. Krayn Technischer Verlag, Berlin W-10, Germany.

THIS is a small volume dealing with the trolley bus, which the author refers to as a modern means of transport. The book contains a history of

trolley road vehicles from the early experiments of Siemens & Halske in 1882, to the latest developments in this branch of engineering, particularly in England. As is well known, most of the early installations of trolley buses were discontinued, and the author's explanation is that they were ahead of their time; that great effort was devoted to the development of the electric railway and that the primitive trolley bus could not compete with the latter. A list of twenty-six different lines established previous to the war is given in the book.

A large part of the book is devoted to descriptions of post-war British systems of trolley bus, the products of seven different plants being considered. The author remarks that the British would hardly continue to invest money in installations of this sort if their profitableness had not been definitely proved, and he prophesies that the trolley bus will find a wide field in Germany also.

Lectures on Steel and Its Treatment

Second edition by John F. Keller, American Society for Steel Treating, 329 pp. 214 ill. 23 tables.

THIS is the second edition of the work which was published in 1928 and represents seven lectures on steel beginning with the preparation of the ingot and ending with notes on current welding practice. Mechanical working of steel, physical testing and heat treatment and normalizing, are among the topics which the author discusses in a direct and understandable fashion.

Illustrations and tables are used generously to clarify obscure or little known phenomena. This book has been completely revised to conform with the latest developments and advances in the art.

Les Applications des Rayons X

By J. J. Trillat. Published by Les Presses Universitaires de France, 49 Boulevard Saint Michel, Paris.

IN this book the applications of X-rays in physics, chemistry and metallurgy are discussed. The author states that he has endeavored to deal most thoroughly with the latest applications of this form of radiation, while passing rapidly over their older and already well-known uses. In the first part are given some generalities regarding X-rays, their production and applications, while in a second part applications in the industries are discussed.

X-rays are being used for many purposes in industry today, and among their uses which are dealt with in the book research on the following substances may be mentioned: Lubricants, paints, cellulose, artificial silk and textile fibers, rubber, resins, gelatin, etc.

Bookshelf

The book concludes with a short treatment of the subject of radiography. Radiography consists essentially in an examination of the internal structure of material, with a view to checking lack of homogeneity or of determining the molecular structure, without destroying the specimen or even without disassembling it. A distinction is made between radioscopy consisting in the study of an image on a fluorescent screen, and radiography, consisting of the study of a photographic print.

A valuable feature of the book is a list of references, following each chapter, to articles in current literature on the subject dealt with in the chapter.

German Motor Manual

Typentafeln des Reichsverbandes der Automobilindustrie, 280 pages. Publisher, Dr. Ernst Valentin Verlag, Berlin-Friedenau I, Sponholzstrasse 7.

THE German Automobile Makers Association has again published its annual book of specifications containing particulars of German and Austrian passenger cars, trucks, buses, special vehicles, tractors, trailers, commercial three-wheelers and stock parts. As compared with former editions, the specifi-

cations have been abridged, and only a single page is now devoted to each model. The book is neatly bound in limp carton covers and is well printed and illustrated. A glossary at the rear gives the English and French equivalents of the German terms employed in the specifications, and measurement conversion tables are also included. The stock-parts division has grown in comparison with former years, and particulars are given of several stock engines, gearboxes, steering gears, clutches, etc., now on the German market.

Mechanical Engineers' Handbook

Lionel S. Marks, editor-in-chief. Third Edition. Published by McGraw-Hill Book Co., New York.

THIS third edition of the well-known Marks' Mechanical Engineers Handbook has been considerably enlarged and more highly specialized, and it is the work of a larger number of authors, about seventy having contributed to its pages. The general arrangement of the book has remained unchanged, but in a number of cases general subjects have been sub-divided and the divisions assigned to individual contributors. This applies notably to the former section on Machine Shop Practice which is now sub-divided into five sections each contributed by a separate author. Physical constants and standards of practice have been revised and new sections have been added on topics which have seen considerable development in recent years. In addition to bringing the book up to date in the fields covered by it, the editor-in-chief has endeavored to make it more nearly uniform in method of treatment.

Inspecting Studebaker Pistons

EVERY Studebaker piston is checked for roundness in a master jig with a pointer resting on the circumference. As the piston rotates, a dial reveals any defect. Next the piston is gaged for size in a series of ring gages ranged in a row, each one-half thousandth of an inch larger than the preceding one. By means of these master gages, the exact diameter of each piston is checked and marked on the piston. When assembling the engine, inspectors select pistons to each individual bore size so that there is an exact clearance of 0.0015 in. between each piston and the bore.

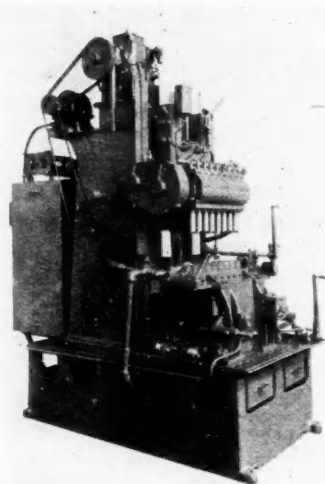
Checking Studebaker pistons for roundness in master jig



NEW DEVELOPMENTS—AUTOMOTIVE

Moline No. 11 Hydraulic Lapper and Honing Machine

THE Moline Tool Co., Moline, Ill., has brought out a new lapping or honing machine, known as the No. 11 hydraulic lapper with electric braking motor. One of the features of this machine is in the drive to the spindles. After the reciprocating rail has completed a predetermined number of strokes, and at the instant



it reaches the end of the withdrawal stroke, a switch is automatically tripped, which reverses the main driving motor, causing it to act as a brake and to bring the spindles to a quick stop. The instant the motor stops, a stopping switch at the end of the armature shaft automatically shuts off the current, thus preventing the motor from running in the reverse direction. The hones can then be adjusted for stone wear, unless they are of the type which can be adjusted while the spindles are rotating.

The main driving motor is located inside the column, and through an enclosed silent chain at the left side drives an intermediate shaft on the rail. Speed-change gears are enclosed in the gearcase at the left end of the rail to transmit the power from the intermediate shaft to the long helical pinion which in turn drives the spindles through helical gears. Ball and roller bearings are used throughout in the drive to the spindles.

A "start-and-stop" push-button control for the main driving motor is conveniently located at the front right-hand corner of the jig. This control is of the totally enclosed type and prevents kerosene from entering. While the spindles are automatically stopped at the end of each cycle by means of the push-button control, they may also be stopped or started at any part of the cycle.

An enclosed reversing panel and a resistor, both for the main driving motor, are mounted at the back side of the column. The resistor is located on top of the reversing panel.

The Oilgear pump for reciprocating the rail is located on top of the column and is driven by a separate motor, also mounted on top of the column.

The small motor which drives the Oilgear pump also has "start-and-stop" pushbutton con-

trol, the control switch being conveniently located on the left hand-front corner of the jig and totally enclosed. When the rail reaches the end of the withdrawal stroke the reciprocation is automatically stopped, but by means of a hand lever located on top of the jig, the reciprocation can be stopped at any time. For instance, if it is desired to do corrective lapping the hones can be stopped from reciprocating at any part of the stroke and allowed to rotate in any part of the bore.

The entire reciprocating rail assembly has one-shot lubricating system.

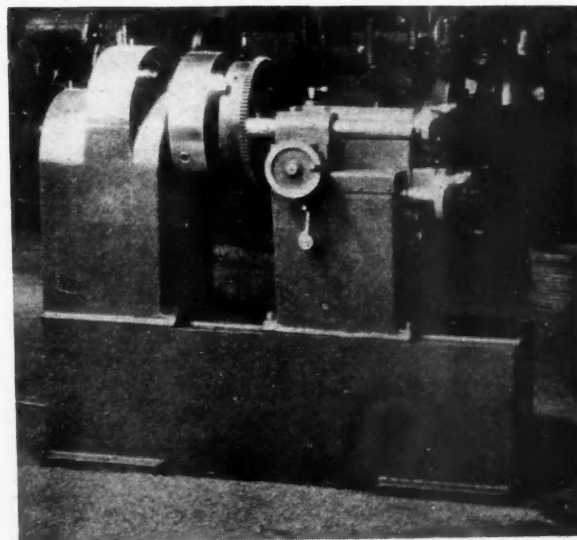
To facilitate moving the cylinder block in and out of the holding fixture, rollers are provided which are so arranged that by raising a lever at the right-hand end of the jig, the rollers raise the cylinder block up and off of the hardened steel rest pads and clear of the locating pins. The cylinder block then rides on the rollers.

The tank base is provided with two settling pans and five settling compartments, to rid the kerosene of grit before it reaches the last compartment, from which it is pumped.

Brake Drum Flywheel Turning Lathe

THE largest dual truck wheels may be swung without removing the tires, on the new Brake Drum Flywheel turning lathe developed by The Greaves Machine Tool Co., Cincinnati, Ohio. It is equipped with a Universal chuck with capacity for the full range of flywheels and is also adaptable for trueing differential housings.

Four spindle speeds are available, the main spindle being driven by a $\frac{3}{4}$ hp. motor. The



PARTS, ACCESSORIES AND PRODUCTION TOOLS

machine is also provided with a power feed with reverse, driven by a $\frac{1}{4}$ hp. motor. Both motors are inclosed within the machine and drive through gearing.

Floor space required is 30 x 60 in.

Fellows 6A-Type Gear Shaper Has 3-Inch Stroke

LIMITING the cutting stroke on the 6A-type Gear Shaper to 3 in. instead of 5 in. has made it possible to eliminate the customary cutter-slice so as to use a one-piece cutter-spindle similar in design to that on the high speed gear shaper made by The Fellows Gear Shaper Co., Springfield, Vt. This change in design has increased the productive capacity of this machine, making possible the use of coarser feeds

and somewhat higher reciprocating speeds.

The new cutter-spindle is made from a one-piece forging with guide attached. It is hollow to reduce weight, and the counterbalance spring is completely enclosed in the spindle, making possible the use of a longer spring working under tension rather than compression. And as the spring is practically twice as long as that used on the 5-in. stroke machine its life is expected to be materially increased. Another noteworthy feature is the drive, the cutter-spindle being provided with a cylindrical rack, and meshing with this rack is an "enveloping" pinion with two integral keys. Key shearing is therefore eliminated and a steady and positive drive for the cutter assured.

Worthington Adopts Multi-V-Drive Belt

GOODYEAR Emerald cord belts have been adopted by the Worthington Pump & Machinery Corp., Harrison, N. J., for their newly developed Multi-V-Drive. This drive consists of a number of endless molded V-belts running in V-grooved sheaves. The load-carrying members are high-grade cotton cords arranged in parallel lines and concentrated about the neutral axis.

Each sheave is carefully grooved, machined and finished so that the grooves present a smooth surface on which the belts run. The wedging action between the belts and the grooves is said to result in a slipless, powerful grip which compensates for, but differs from, initial belt tension in a flat belt drive.

Brown & Sharpe No. 00G Automatic Screw Machine

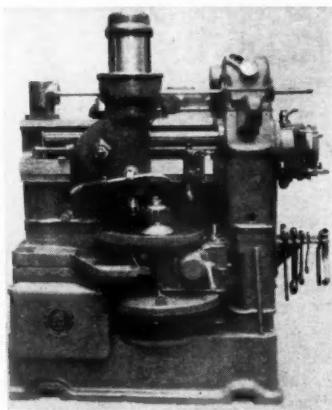
THIRTY spindle speed changes ranging from 243 to 5000 r.p.m. are now available on their No. 00G Automatic Screw Machine (high speed) (for motor drive only) according to a recent announcement by the Brown & Sharpe Mfg. Co., Providence, R. I. No constructional features other than those required to include this change have been made and the methods of operation are the same as before.

This broad range of speed changes adapts the machine to production from steel as well as brass, aluminum and the other free cutting metals. The speed changes are accomplished by means of 10 change gears and three spindle driving pulleys in ratios of one to three and one to five. The new speed combinations are particularly advantageous, as they make it possible to secure a high speed for forming and similar operations and a low speed for threading.

Tool Revolving Automatic Chucking Machine

AN intermediate sized unit, $8\frac{1}{2}$ x 8, has been added to their line of tool revolving automatic chucking machines by The Goss & DeLeeuw Machine Co., New Britain, Conn.

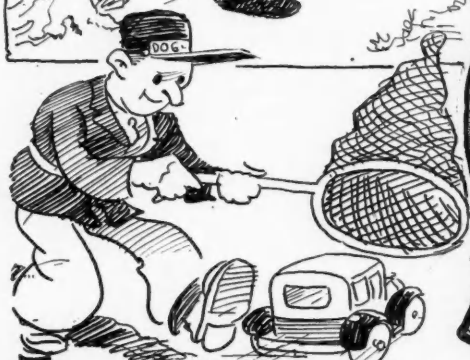
It is identical in design to the other two sizes previously described, namely, 6 x $6\frac{3}{4}$ and 11 x 10, but is made midway in size and capacity. The four spindles are $8\frac{1}{2}$ in. apart on centers, and the total feed stroke is 8 in. Goss & DeLeeuw patented 12 in. 2-Jaw Chucks are standard equipment. As on the other two machines, the threading spindle is controlled by a lead screw in constant engagement.



Automotive Oddities — By Pete Keenan



CONCRETE IS SOFT STUFF AFTER ALL. LIGHTNING HIT A TREE, RAN ALONG THE ROOTS AND LEFT POT-HOLES 3 FT. WIDE FOR 150 FT., Armstrong County, Penna., 1930.



THE DOG CATCHER OF PORTERVILLE ALSO CATCHES AUTOMOBILES ON WHICH THE CITY TAX HAS NOT BEEN PAID.



A GARAGE IN CHICAGO HAS TWO MECHANICS: WM. GOOD AND HARRY QUICK. THE BOSS CAN OFTEN BE HEARD CALLING: "GET THAT JOB DONE, GOOD AND QUICK."

RUTH ALEXANDER ROSE 5 MILES OVER THE EARTH, BREAKING THE WOMAN'S ALTITUDE RECORD WHILE UNCONSCIOUS. July 12th 1930.



COUNT De DION DISCOVERED GEORGE BOUTON, LATER TO BE THE GUIDING MECHANICAL GENIUS OF HIS AUTOMOBILE PLANTS, WORKING AS A TOY MAKER AT 8 FRANCS A DAY. Paris, 1891.



NEWS OF THE INDUSTRY

Car Fatalities Show Increase

**Gain 11 Per Cent
Over Preceding Year
in Latest Report**

WASHINGTON, July 31—The year ending July 12 showed an increase of 11 per cent over the previous year in the rate of fatalities from automobile accidents, according to a statement on July 26 by the Department of Commerce.

The statement, based on reports from 78 large cities, gives the total number of deaths from this cause as 8760 in the 52 weeks ending July 12, showing a recent rate of 26.6 per 100,000 population as against an earlier rate of 24.

Rates are based on estimates of population and are subject to revision when the final results of the 1930 census becomes available, says the department's statement.

Graham Reports Loss

DETROIT, July 31—Graham-Paige Motors Corp. and subsidiaries report for quarter ended June 30, 1930, net loss of \$391,480 after charges, comparing with net loss of \$489,480 in preceding quarter and net profit of \$818,070, equal after preferred dividend requirements on 7 per cent first and second preferred stocks, to 51 cents a share on 1,442,783 no-par shares of common stock in second quarter of 1929.

For six months ended June 30 net loss was \$880,960 after charges, against net profit of \$1,341,711, or 80 cents a common share, in first six months of preceding year.

Balance sheet as of June 30, last, shows current assets, including \$4,025,257 cash, of \$14,355,599 and current liabilities \$3,652,143.

Spicer Reports Profit

Spicer Manufacturing Co. and subsidiaries report for six months ended June 30, 1930, profit of \$417,943 after depreciation, etc., but before Federal taxes comparing with \$1,552,824 in first half of 1929.

Profit for quarter ended June 30 amounted to \$214,150 before Federal taxes.

Propose Compulsory Car Ash Receivers

SALEM, ORE., July 31—A law making it compulsory for motorists to install receptacles in their motor cars for the disposal of lighted matches, cigars and cigarette stubs is being considered in Oregon for presentation to the 1931 legislature, according to a letter written by the state fire marshal, Clare A. Lee.

Dirigible to Have German Engines

WASHINGTON, July 31—German engines will be installed in the first of two new Navy dirigibles being constructed at Akron, Ohio, it was stated orally in behalf of the Bureau of Aeronautics July 26, but no plans have been made yet for the sort of motors to be used in the second lighter-than-air ship.

Eight engines of the BL-2 type have been ordered from the Maybach Co., German manufacturers of the engines with which the dirigible "Los Angeles" was equipped.

The Bureau of Aeronautics did not state whether any attempts had been made to purchase the necessary equipment in this country.

Roberts Resigns From Moon

ST. LOUIS, July 29—J. E. Roberts has announced his resignation as vice-president and general manager of New Era Motors, Inc., and of the Moon Motor Car Co., to which New Era sold rights to manufacture the Ruxton automobile. Mr. Roberts has been associated with New Era since the organization of the corporation in May, 1929. He has announced no plans.

Eleven Cars Wired for Radio

DETROIT, Aug. 2—The Automobile Radio Corp., manufacturer of the Transitone radio receiving set for automobiles, has made known that the number of passenger car manufacturers who are wiring their closed cars for installation of Transitone includes: Chrysler, De Soto, Dodge, Franklin, Hupmobile, Jordan, Packard, Peerless, Pierce-Arrow, Plymouth and Studebaker.

Airplane Output Drops From 1929

**Engine Production
Also Less in First Half
A. C. C. Figures**

NEW YORK, July 31—Fifty-eight major aircraft manufacturers reporting to the Aeronautical Chamber of Commerce produced 785 commercial and military airplanes valued at \$6,475,992.92, without motors, during the second quarter of 1930, as compared with 630 planes valued at \$4,570,063.36, without motors, in the first quarter. During the first six months of the year, 1415 airplanes valued at \$11,046,056.28, without motors, were produced.

Nineteen aircraft engine manufacturers reporting listed 1152 engines produced during the second quarter, as compared with 900 engines produced in the first three months of the year. The total number of engines produced in the first six months of 1929 was 3826.

Engines produced in the first six months of 1930 were valued at \$8,445,777.79, as compared with \$14,349,375.45 in 1929, which was a peak year. Commercial engine production in the second quarter of 1930 totaled 719 units, with a value of \$1,981,885. Military engines manufactured during the same period totaled 433 units, with a value of \$2,400,790.

Statistics on airplanes produced during the second quarter brought the total value of airplanes, engines and spare parts produced in the United States during April, May and June to \$14,470,425.99, as compared with \$11,297,197.48 in the first quarter. The total value of aeronautical products manufactured in the first six months of 1930 was \$25,767,623.47, approximately half the total valuation of products manufactured in the same period of 1929.

Midland Buys Patents

CLEVELAND, July 29—The Midland Steel Products Co. has acquired all the rights under the American and foreign patents covering air brakes for automobiles and air brakes and starters for airplanes and boosters for all styles of brakes from N. A. Christensen, inventor.

British Dirigible R-100, Equipped with Rolls Engines, Completes Voyage to Western World

PHILADELPHIA, July 31—As *Automotive Industries* goes to press the British dirigible R-100 is reported 100 miles west of Quebec in its projected flight from England to St. Hubert Airport, Montreal, Canada. Leaving Cardington, England, Monday evening, July 28, the giant dirigible, the largest in active operation, took a great circle route to the Western Hemisphere. The average speed of flight was considerably reduced by fog and headwinds, but no serious mechanical difficulty was reported. As the ship neared Canada, unexpectedly favorable atmospheric conditions expedited the fag end of the voyage.

The R-100 is equipped with six Rolls-Royce Condor III-A engines of about 650 hp. each. It is a 12-cylinder water-cooled engine with the cylinders arranged in two banks at 60 deg. Each cylinder with its water jacket forms a separate unit.

The cylinder barrel is machined from a steel forging with a holding down flange at its lower end into which the holding-down studs are screwed. There are two inlet and two exhaust valves per cylinder. The valve ports are machined from solid forgings and welded into the integral head of the cylinder. With a bore of 5.51 and a stroke of 7.48 in. (the cylinder dimensions are metric) the engine develops 665 hp. at 1900 r.p.m. All valves of the same bank of cylinders are operated by a single camshaft.

There are three cams on the camshaft for each cylinder, the central cam operating two rocker arms while the outer cams operate a single valve each. Since the cylinder heads are hemispherical in shape and the valves seat directly in the head, the valve stems make an angle with the cylinder axis. The rocker arm naturally must swing in a plane parallel to the axis of the valve stem, and this plane cannot be at right angles to the camshaft axis. Therefore, if the rocker arms were to be operated through rollers carried rigidly upon them, lateral loads on the rocker arm would result.

This difficulty is overcome by interposing a cylindrical tappet between the cam and the rocker arm, the tappet moving in a vertical guide in the cam-

shaft housing. The tappet is slotted to receive the end of the rocker arm, which latter is operated from a hardened surface at the bottom of the slot.

The drive for the camshaft and for all engine accessories is through a pinion at the rear end of the crankshaft. In order to prevent the transmission of torsional vibration of the crankshaft to the camshaft and the accessories, and consequent extra stressing of the drive gear, this pinion is fitted with a friction-damped spring drive.

Connecting rods are of I-section and are machined all over. Rods for one bank of cylinders are forked. These forked rods are provided with a bab-bitted steel-block big end, which bears on the crankpin over its whole length. The steel block is bab-bitted on its cylindrical outside surface between the two prongs of the forked end, and the big ends of the plain connecting rods bear on the bab-bitted central portions of these steel blocks. Full-floating bushings are carried in the upper ends of the connecting rods.

Condor III-A engines are fitted with a spur-type reducing gear giving a reduction of 2.095 to 1. From the crankshaft power is transmitted to the propeller through a single spur reduction gear. A flange is formed on the front end of the camshaft, and to this flange an internally-toothed ring is bolted, the teeth of the ring engaging with similar teeth on the end of a short hollow shaft. The opposite end of this shaft is formed with splines which transmit the torque to a hollow pinion mounted in roller bearings.

This arrangement prevents transverse loads from the gearing being transmitted to the crankshaft. The pinion meshes with a tooth-wheel mounted on and keyed to the propeller shaft which is supported in roller bearings and provided with ball thrust bearings for the propeller thrust. The entire reduction gear is enclosed in an aluminum housing in two parts which is bolted to the crankcase.

In the dry state the Condor III-A engine weighs 617 lb. or 0.93 lb. per horsepower. Its fuel consumption is given as 0.472 lb. per horsepower-hour. The compression ratio is 6.5 to 1.

\$2 previously paid. The 25 cent payment will be made Aug. 1 to stock of record on July 24.

Mansfield Buys Century

CHICAGO, July 29—Purchase of the name and equipment of the Century Tire & Rubber Co. of Chicago has been announced by the Mansfield Tire & Rubber Co. of Mansfield, Ohio. Century products, including Century tires and tubes, will be manufactured by the Mansfield plant.

Spain Increases Duties on Cars

New Rates Effective
July 22, by Decree

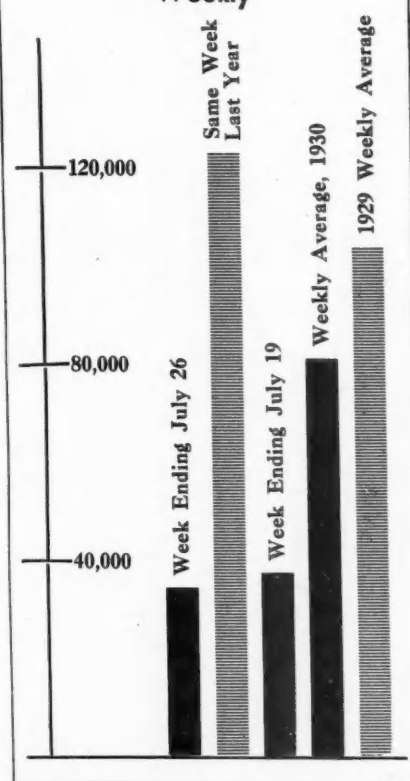
WASHINGTON, July 31—American-made automobiles, whether built in the United States or assembled in foreign branches, will be subjected to higher import duties when shipped to Spain, effective July 22, by royal decree. Other duties also have been increased by Spain, according to a radiogram received by the Department of Commerce from Trade Commissioner Julian Greenup, Madrid.

The Spanish decree provides higher duties on "non-European automobiles assembled in Europe outside of Spain in order to favor direct navigation between our ports and those outside of Europe." Shipments on the high seas on July will not be affected. Duties on motorcycles were also increased.

Gemmer Reports Profit

DETROIT, July 30—Gemmer Mfg. Co. reports for six months ended June 30 profit of \$270,834 after charges but before Federal taxes, comparing with \$296,696 in the first half of 1929. Capital stock consists of 40,000 no par shares of \$3 cumulative participating convertible Class A preferred and 100,000 no par shares of Class B stock. Current assets as of June 30 amounted to \$1,499,486 and current liabilities \$192,288, a ratio of 7.8 to 1. Cash amounted to \$305,546.

Automotive Industries
Production Chart
Weekly



McCord Reports Profit

DETROIT, July 29—McCord Radiator & Mfg. Co., Detroit, reports for the six months ended June 30, 1930, net profit of \$115,142, after charges and Federal taxes, equivalent to 42 cents a share on 172,300 non-par shares of Class B stock after allowing for the dividend requirements on the Class A stock. Directors recently declared a quarterly dividend of 25 cents a share on the Class B stock, placing it on a \$1 annual dividend basis, against the

Copper Market Shifts to Sellers' Benefit

Other Metals Quiet;
Zinc Position Bettered

NEW YORK, July 31—The broad buying movement which developed in the copper market in the last 10 days furnishes tangible proof that at inviting price levels consuming demand has lost none of its appetite. It has been so long since demand and supply in any of the metal markets tipped the scales to the point where sellers begin to go slow in the face of offers for round tonnages that the spectacle was heartening to the metal market as a whole.

Some of the large producers considered it apparently a wise move to stimulate demand further by permitting buyers of representative tonnages to cover their nearby and September requirements at 11 cents, but smaller consumers found it somewhat hard sledding to find sellers in the "outside" market at 11¼ cents. The zinc market is also looking up, due in some measure to large producers withholding from the market supplies that would clog it.

In the steel market it may be taken as a constructive factor that nothing has happened to depress prices further. Operating schedules are light, but week-to-week estimates of how much of the capacity of rolling mills is actively engaged must be interpreted with due regard to the spreading of unfilled tonnage over a longer time than usual, not only to bridge the gap until more active buying sets in, but also to make part-time employment for operatives as painless as possible. Some of the Mahoning Valley mills are waiting for a better accumulation of orders before resuming production, complete shutdowns at this time of the year being preferred by many steel mill workers to two or three days' work a week. Although a good many purchasing agents are away on vacation, quite a little business is in process of negotiation or in the inquiry stage. None of this is individually large, but in the aggregate it is encouraging.

Pig Iron—Blast furnace selling agents report an undeniably better feeling among consumers, but this has not yet resulted in much increased buying. Additional shutdowns by furnaces are rumored. The market is nominally unchanged.

Aluminum—Imports of aluminum during the first five months of the year totaled 14,384,581 pounds compared with 19,209,580 pounds in the corresponding period of 1929. Demand is of a light, routine character with prices unchanged.

Copper—Some of the smaller consumers have been in the market early this week with a view to picking up 11c copper in tonnages thought to be considerably beyond their own requirements, indicative of the belief gaining ground that 11c copper is a good speculative investment.

Tin—Quiet and dull with Straits opening at 30.10c on Monday. Announcement by the Tin Producers' Association that curtailment of production over the remainder of the year would aggregate 17,100 tons has had little effect on the market.

Davenport Joins Hupp

DETROIT, July 29—George R. Davenport, formerly on the engineering staff of Studebaker and more recently with Graham-Paige, has joined the engineering staff of the Hupp Motor Car Corp.

Ainsworth Reports Profit

CHICAGO, July 29—The Ainsworth Mfg. Co. reports earnings for the first half of this year totaling \$336,187 after all charges, including Federal taxes, which are equivalent to \$2.08 a share on the 163,331 shares of common stock outstanding. This compares with \$698,756, or \$4.43 a share for the first half of 1929, the number of shares then being 157,000.

Current assets as of June 30 totaling \$2,443,471, of which \$989,199 was in cash, are shown in the balance sheet. Total current liabilities amount to \$307,440, a ratio of better than 7 to 1. Both the cash on hand and the current position of the company show increases as compared with the similar period of 1929.

Chevrolet Promotes Wallace

DETROIT, July 29—E. S. Wallace, formerly assistant plant manager of the Bay City division of the Chevrolet Motor Co., has been promoted to plant manager succeeding S. A. Woodmancy, who has been appointed plant manager of the Chevrolet plant in Toledo, Ohio.

Cadillac to Market Twelve-Cylinder Car

Will Be Introduced
in Early Autumn

DETROIT, July 30—Early autumn production by the Cadillac Motor Car Co. of a 12-cylinder passenger car in addition to the currently manufactured Vee eights and sixteens, has been announced by Lawrence P. Fisher, president of the company. The announcement was made in addressing a group of Cadillac-LaSalle distributors.

"The V-12 line," according to Mr. Fisher, "has been in process of development along with the V-16 and is intended to take its place between this exclusive custom line and the Cadillac V-8 line. The V-12 engine is of the same type and built to exactly the same standards as the V-16—in fact a duplicate of this engine in pattern and appearance but having 12 instead of 16 cylinders.

"The addition of the 12-cylinder line," Mr. Fisher said, "is a logical step and might well have preceded the introduction of the Cadillac V-16 which made its debut at the National Automobile Show in New York."

Franklin A.C. Elects Gole

CHICAGO, July 29—J. N. Gole has been elected vice-president and treasurer of the Franklin Acceptance Corp.

Men of the Industry

Reo Names Boutelle

Charles E. Boutelle, until recently director of distribution for the Chrysler Corp., is the new regional manager for the Reo Motor Car Company in the North Atlantic region, Elijah G. Foxson, general sales manager of Reo, has announced.

Mr. Boutelle was with the Goodrich Rubber company for many years in various capacities. His experience has covered a broad field in the automotive industry.

Mitchell Joins G.M.A.C.

Announcement has been made that Hamish Mitchell, representative of the Guardian Detroit Co., affiliated with the Union Industrial Bank, Flint, Mich., has accepted a position with the General Motors Acceptance Corp. with headquarters in London, England. Mr. and Mrs. Mitchell, with their daughter, Joan, will sail for England Aug. 20.

Kennan Succeeds Cornman

George W. W. Cornman, treasurer and manager of the service department of the Brown Instrument Co., Philadelphia, will retire from active

business as of Aug. 8, according to an announcement from the company. The service department of the company will be in charge of R. C. Kennan, according to the announcement.

Berliner-Joyce Promotes Two

The Berliner-Joyce Aircraft Corp. has announced that William H. Miller, chief of research, has been promoted to assistant chief engineer. At the same time it also was announced that George Arnold, who has had many years' experience in aviation work, has been made factory manager.

Moody Leaves Fisk

Curtis L. Moody, general superintendent of the Fisk Rubber Co. at Chicopee Falls, Mass., since 1916, has resigned to become factory manager of the Dominion Rubber Co. of Canada, as of Aug. 15.

Norwalk Leaves Murray

Albert B. Norwalk, who held the position of vice-president in charge of sales of the Murray Rubber Co., Trenton, N. J., has resigned and returned to New York.

Chance Vought Dies After Brief Illness

Designed Standard
Types of Airplanes

NEW YORK, July 28—Shortly before the last rites at the grave of Glenn Curtiss had been completed, Chance M. Vought, contemporary of the Wright brothers and Glenn Curtiss, died of septicemia in the Southampton, L. I., hospital on July 25. He was 42 years old at the time of his death.

Mr. Vought was the founder and president of the Chance Vought Corp., aircraft manufacturers, now merged with the United Aircraft & Transport Corp. of which Mr. Vought was a vice-president and director. He was also a vice-president of the Society of Automotive Engineers, representing aircraft activity.

In the early days of the airplane, Chance Vought was one of the first persons to learn to fly under the instruction of Orville and Wilbur Wright. His interest in aircraft brought many associations with flying clubs and manufacturers. In 1916 he was appointed chief engineer of the Wright Aeroplane Co., now a part of the Curtiss-Wright organization. During the war he designed a plane which was used by the Allies.

The Vought Corsair fighting plane is at present standard equipment for the U. S. Marines, and in a number of foreign navies.

Dodge Managers Meet

DETROIT, July 31—Fifty-four Dodge Brothers district managers, passenger car and truck sales representatives from all over the United States attended a two-day sales conference at the Dodge factory in Detroit this week.

Outside of a luncheon at the factory on both days, the sessions of the conference were devoted entirely to a review of business conditions in all sections of the country during the first half of the year and to the shaping of plans for the last six months of 1930.

Curtiss Chinese Plan Ratified

NEW YORK, July 30—The Kuo Min News Agency, in a dispatch from Shanghai today, announced ratification by the State Counsel of the new Sino-American aviation contract. The agreement is between the China National Aviation Corp. and the Curtiss China Airways Co. for reorganization of air mail and passenger service in China.

Detroit S.A.E. Office to Close

DETROIT, July 29—The Detroit office of the Society of Automotive Engineers will be closed from July 28 through Aug. 16, while Beulah I. Brede, assistant secretary-treasurer, is on vacation. Activities will open in the fall with the national production meeting, Oct. 7 and 8.



Chance M. Vought
died July 25

Overland to Redeem Bonds

NEW YORK, July 30—The National City Bank of New York, as trustee, has issued a notice to holders of the Willys-Overland Co. first mortgage 6½ per cent sinking fund gold bonds, due Sept. 1, 1933, that \$996,000 aggregate principal amount of the bonds have been drawn for redemption at 101 on Sept. 1. The bonds so drawn will be redeemed upon presentation and surrender, with subsequent coupons attached, at the head office of the National City Bank of New York on and after Sept. 1, after which date interest on the drawn bonds will cease.

Strickland Leaves Cadillac

DETROIT, July 31—W. R. Strickland, assistant chief engineer of the Cadillac Motor Car Co., has announced his retirement from the Cadillac organization. Mr. Strickland is a past president of the Society of Automotive Engineers. During the war he was connected with the Peerless Motor Car Co., Cleveland.

He has announced his intention to spend the remainder of the summer with his family in Estes Park, Colo.

New Reo Anticipated

LANSING, July 31—Reo distributors and dealers in various parts of the country are advertising reduced prices on passenger cars to help clear their stocks for new models which, it is said, will appear in the next several weeks. Neither factory officials nor retail outlets would disclose any details concerning the new models or the date on which they will be announced.

Heiskell Completes 25 Years

INDIANAPOLIS, July 31—Twenty-five years of service as a Marmon official have been completed by A. R. Heiskell, vice-president and secretary of the Marmon Motor Car Co.

N.A.C.C. Protests Spanish Tariff

Alleges Discrimination
Against U. S. Manufacturers

WASHINGTON, July 29—A formal protest against recent increase by Spain of automobile tariffs was filed with the State Department today by the National Automobile Chamber of Commerce.

The complaint, officials of the organization explained, is directed particularly against a new section of Spain's tariff laws providing that all non-European cars assembled in Europe outside of Spain must pay a flat rate of three gold pesetas per kilo.

The chamber holds the flat rate clause is a discrimination directed at cars of American manufacture, on the ground that no cars are assembled in Europe, aside from those of European manufacture, except those of American manufacture.

Henry Ford Celebrates

DETROIT, July 30—Henry Ford is 67 years old today. With no celebration planned to mark this event the manufacturer left here yesterday with Mrs. Ford and his secretary for New York, thence to go to the home of Thomas Edison at East Orange, N. J. The inventor is making his annual selection for a technical scholarship and tomorrow a youth from each state and from District of Columbia will compete in examination for same.

Plymouth Wired on Order

DETROIT, July 29—Radio equipment, manufactured by the Automobile Radio Corp., is now available for installation on all new Plymouth closed body styles, it is announced by F. L. Rockelman, president and general manager of Plymouth Motor Corp. Plymouth purchasers on special orders, without extra cost, may obtain their cars wired for the instantaneous installation of Transitone from any Chrysler, Dodge Brothers or De Soto dealer.

Kelsey-Hayes Earns \$2.24

DETROIT, July 30—Kelsey-Hayes Wheel Corp. and subsidiaries for six months ended June 30 showed a net profit of \$1,803,228 after Federal taxes, etc. It is equal after dividend requirements on the 7 per cent preferred to \$2.24 a share on 749,454 no par shares common against \$1,975,779, or \$2.43 a share, in the first half of 1929.

Litchfield Returns to U. S.

NEW YORK, July 31—Paul W. Litchfield, president of the Goodyear Rubber Co., returned from Europe on the S.S. Bremen today.

Exports, Imports and Reimports of the Automotive Industry for June of Current Year, and Total for Six Months Ended June, 1930

	Month of June 1929		Month of June 1930		Six Months Ended June 1929		Six Months Ended June 1930	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
Automobiles, parts and accessories .....	..	\$50,797,135	..	\$20,974,487	..	\$338,953,669	..	\$182,806,062
Electric trucks and passenger cars	49	82,344	1	3,560	93	139,839	29	52,732
Motor trucks and buses except electric (total)	16,789	10,138,016	5,336	3,816,737	102,701	61,142,784	55,050	36,506,786
Up to 1 ton inclusive	12,516	5,811,731	1,444	877,971	74,885	33,591,885	21,920	11,841,367
Over 1 and up to 2 1/2 tons	3,955	3,499,287	3,578	2,274,082	25,971	22,697,179	30,435	19,168,020
Over 2 1/2 tons	318	826,998	314	664,684	1,845	4,853,720	2,695	5,497,399
PASSENGER CARS								
Passenger cars except electric (total)	34,109	22,705,235	10,101	7,316,190	219,613	151,194,261	106,908	74,393,244
Low price range \$1,000 inclusive	26,860	13,477,731	7,335	3,813,170	167,976	86,650,659	78,118	39,724,905
Medium price range \$1,000 up to \$2,000	6,253	6,721,618	2,332	2,443,213	45,402	49,558,725	25,224	26,147,862
High price range over \$2,000	996	2,505,886	434	1,059,807	6,235	14,984,877	3,566	8,520,477
PARTS, ETC.								
Parts, except engines and tires .....	..	..	..	..	..	..	..	..
Automobile unit assemblies .....	..	10,810,492	..	5,625,965	..	73,409,548	..	38,935,176
Automobile parts for replacement (n.e.s.) .....	..	5,416,849	..	3,427,745	..	39,386,010	..	24,500,117
Automobile accessories .....	..	724,219	..	462,731	..	5,574,104	..	3,400,781
Automobile service appliances (n.e.s.) .....	..	787,325	..	684,704	..	3,865,089	..	3,749,725
Trailers	148	46,074	51	47,509	525	246,240	883	421,296
Airplanes, seaplanes and other aircraft	48	812,004	54	796,259	194	3,247,074	186	2,838,482
Parts of airplanes, except engines and tires ..	..	207,015	..	201,495	..	1,053,525	..	1,141,454
BICYCLES, ETC.								
Bicycles	472	12,656	637	15,935	2,660	71,990	2,279	60,709
Motorcycles	1,045	238,206	516	118,827	10,913	2,460,808	7,828	1,793,417
Parts and accessories, except tires .....	..	74,843	..	64,170	..	596,229	..	607,207
INTERNAL COMBUSTION ENGINES								
Stationary and Portable .....	..	..	..	..	..	..	..	..
Diesel and Semi-Diesel	34	73,320	14	79,637	449	630,096	158	469,613
Other stationary and portable: .....	..	..	..	..	..	..	..	..
Not over 10 Hp.	2,567	224,690	2,274	162,628	19,512	1,716,620	14,458	1,136,799
Over 10 Hp.	215	133,308	597	358,778	2,501	1,141,385	3,246	1,826,867
Automobile engines for: .....	..	..	..	..	..	..	..	..
Motor trucks and buses	1,104	115,677	91	23,640	7,006	909,566	18,928	1,530,249
Passenger cars	7,031	731,476	2,696	232,870	66,577	6,836,058	33,043	3,024,702
Tractors	69	20,788	22	6,438	456	121,675	163	68,478
Aircraft	29	111,827	55	223,609	178	830,282	183	832,784
Accessories and parts (carburetors) .....	..	303,018	..	267,687	..	2,362,661	..	2,003,995
*IMPORTS								
Automobiles and chassis (dutiable)	44	116,502	41	49,441	288	641,953	251	414,025
Other vehicles and parts for them (dutiable) ..	..	193,485	..	194,479	..	953,873	..	323,518
*REIMPORTS								
Automobiles (free from duty)	37	51,894	21	18,464	262	322,170	133	113,955

* Figures on imports and reimports for 1930 are only through June 17, when the Fordney-McCumber tariff act expired.

Harley - Davidson Reduces Schedule

MILWAUKEE, July 28—A production of 16,000 motorcycles for the new year beginning Aug. 1 was announced by the Harley-Davidson Motor Co., Milwaukee, during the annual world sales convention just concluded at the factory. The production for the past year amounted to 18,000 units, and the reduction in the 1930-31 schedule amounts to only 10 per cent and is subject to upward revision if business conditions justify it later.

The Harley-Davidson payroll numbers about 1300, or 10 per cent fewer than were at work a year ago. An increase in parts orders has helped to sustain plant operation. There has been a slight decrease in commercial and passenger cycle business, but sales for police equipment have increased, especially for traffic patrol.

Packard Earns 19 Cents a Share

DETROIT, July 26—Packard Motor Car Co. has announced net profit for quarter ended June 30, 1930, of \$2,872,175, after charges and taxes, equal to 19 cents a share, earned on 15,000,000 shares of no-par capital stock. This compares with profit of \$2,654,247, or 17 cents a share, in preceding quarter and \$7,560,530, or 50 cents a share, in second quarter of 1929.

For six months ended June 30, 1930, profit was \$5,526,422 after above

charges, equal to 36 cents a share, which compares with profit of \$14,675,141, or 97 cents a share, in first half of 1929. Cash on hand totals \$17,700,000.

Vauxhall Reports Loss

LONDON, July 12—An adverse balance is reported by Vauxhall Motors Co., the ordinary share capital of which is held by General Motors Corp. There is a deficit of £283,791 for 1929, which follows losses of £266,340 and £320,943 for 1928 and 1927, and the debit balance carried forward is increased to £382,349.

The report just issued states it was decided 12 months ago to produce Chevrolet cars and trucks at the Vauxhall plant at Luton for the British market. This necessitated the expenditure of a considerable amount of capital, which has been provided by General Motors.

No dividend is being paid on the preference shares, which are now 18 months in arrear, but General Motors has bought 276,202 of the total issue of 300,000 shares at a price somewhat in excess of the market value.

W. H. Masten Dies

NEW YORK, July 28—W. H. Masten, manager of the New York branch of Willys-Overland, Inc., until his retirement about two years ago, died after an operation in Rochester, Minn., July 24.

Crude Rubber Trading Light

NEW YORK, July 28—During the past week trading in crude rubber has been very light and price range very narrow, according to F. R. Henderson Corp. On July 25 the Rubber Growers Association in London announced that the recommendations of the Anglo-Dutch Liaison Committee have been adopted by the council of the Rubber Growers Association and by a majority of the representatives of Dutch and other continental producers.

From the above it is apparent that the producing interests are strongly in favor of some sort of restricted production and it remains to be seen whether the British and Dutch governments will consent to enact the necessary legislation.

Arrivals of crude rubber at all ports of the United States from July 1 to 25, inclusive, are estimated at 25,200 tons. The estimate for the month is 37,500 tons.

Stocks in London were increased last week to a total of 80,814 tons, with Liverpool stocks at 28,126 tons. This represents an increase of 313 tons for London as compared with a decrease of 100 tons at Liverpool over the previous week's figures. It is estimated that there will be little change in London stocks during the current week and that Liverpool stocks will increase by an amount in the neighborhood of 250 tons.

S.A.E. Plans National Aeronautic Meeting

Program Announced
From New York Office

NEW YORK, July 28—Sessions on Engines, Airplane Design, Aircraft Fuels, Spinning Characteristics, etc., will be on the program of the Chicago Aeronautic Meeting of the Society of Automotive Engineers, according to an announcement of the program of the meeting made from the offices of the Society here today. The meeting is to be held at the Palmer House, Chicago, Aug. 26-28, in connection with the National Air Races. The program follows in detail:

Session Tuesday morning, Aug. 26: J. H. Geisse, vice-president, Comet Engine Corp., chairman. Papers—Manufacturing Costs of Aircraft Engines by E. D. Herrick, chief engineer, Lycoming Mfg. Co.; Comparative Data on Power Plants for Motor Cars and Aircraft, by H. M. Crane, General Motors Corp.

Session Tuesday evening: B. Russell Shaw, president, B. Russell Shaw Co., chairman. Papers—Flight Research by J. W. Crowley, Jr., National Advisory Committee for Aeronautics; The Possibilities of Radical Aircraft Design, by William B. Stout, president, Stout Engineering Laboratories, Inc.

Session Wednesday morning: Mac Short, chief engineer, Stearman Aircraft Co., chairman. Papers—Weight Saving by Structural Efficiency, by Charles Ward Hall, president, Hall Aluminum Aircraft Corp.; *ibid.*, by A. A. Gassner, chief engineer, Fokker Aircraft Corp.

Session Wednesday evening: Dr. George W. Lewis, director of aeronautical research, National Advisory Committee for Aeronautics, chairman. Symposium on Spinning Characteristics by pilots and engineers.

Sessions Thursday morning: Wesley L. Smith, superintendent Eastern division, National Air Transport, Inc., chairman. 15-minute discussions.

William B. Stout will be chairman of the Aircraft Banquet on Thursday evening. The speaker will be Senator Ford, and the subject "Unhappy Landings."

Packard Electric Adding

WARREN, OHIO, July 29—Packard Electric Co. plans the erection of a wire-drawing plant, one story in height, according to an announcement from the company. Capacity of the building will provide for future expansion.

Chrysler Marine Sales Gain

DETROIT, July 29—Sales of Chrysler marine engines in June showed an increase of 80 per cent over June, 1929, it was announced this week by H. E. Fromm, sales manager of the marine engine division of Chrysler Corp.

Packard Resumes Aug. 4

DETROIT, July 28—Following its annual two weeks' general vacation, operations at the plant of the Packard Motor Car Co. will be resumed in full Aug. 4.

Americans Protest Rubber Restriction

NEW YORK, July 28—The Rubber Exchange of New York reports that American rubber manufacturing companies who own rubber plantations in the Far East voted against restrictions proposals at a meeting of producers in the Dutch East Indies. A recent cable from Amsterdam read:

"At a meeting of Dutch rubber producers, 112 companies, representing a production of 38,905 tons annually, declared themselves in favor of a proposal in regard to restriction, while 21 producers, representing 25,992 tons belonging to American producers who work the product in their own factories, voted against the proposals."

Show Managers Meet

PHILADELPHIA, July 30—Managers of automobile associations and shows all over the United States were guests today of S. A. Miles, veteran manager of the National Automobile Shows in New York and Chicago, at his summer home in Christmas Cove, Me. The occasion was the annual Before Shows Convention of the National Association of Show and Association Managers. Discussion of local show dates occupied the program, with Claude E. Holgate, manager of the Newark, N. J., show, as featured speaker. Robert E. Lee, St. Louis manager, heads the showmen. Leon F. Banigan, editor, *Motor World Wholesale*, is secretary of the association.

I.H.C. Recalls Workers

MILWAUKEE, July 28—Following the closing of a contract between the International Harvester Co. and the Amtorg Trading Corp. for 6000 tractors for Russia, the tractor division of the Milwaukee I. H. C. works has recalled a large part of the men laid off some time ago when production required sharp reduction. The contract will require fully three months to execute is valued at \$7,000,000. The tractors for Russia are equipped with electric lighting systems for 24-hr. operations and have extra power take-offs to facilitate the operation of power-driven implements while in motion.

Arrow Makes Export Sale

LINCOLN, NEB., July 29—Its first export sale has been made by the Arrow Aircraft & Motors Corp., according to James Fisher, Arrow sales director.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, July 30—General trade last week continued slack. The hot weather was no help to general retail trade, while it gave little stimulus to sales of light summer goods; for the summer is nearly two-thirds over. Industrial activity is less than the usual mid-summer dullness warrants. There is still a great deal of unemployment, and wage reductions have been reported in some sections. Unemployment in 13 industrial groups, according to the United States Department of Labor, decreased 1.8 per cent during June, while total wages decreased 2.7 per cent.

MERCHANDISE EXPORTS

Merchandise exports during June were 24 per cent below those in the corresponding month last year, while imports were 29.3 per cent below. Exports during the first half of this year were 20.7 per cent below those a year ago, while imports were 24.1 per cent below. The export surplus for the first half of this year amounted to \$344,033,000, as against \$306,713,000 a year ago.

CAR LOADINGS

Railway freight loadings for the week ended July 12 totaled 515,985 cars, which marks a decrease of 150,429 cars below those a year ago and a decrease of 108,940 cars below those two years ago.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended July 19 amounted to 2,500,100 bbl. as against 2,530,800 bbl. for the preceding week and 2,893,950 bbl. a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended July 26 stood at 83.3, as against 83.4 the week before and 84.5 two weeks before.

BROKERS' LOANS

Brokers' loans in New York City for the week ended July 23 decreased \$17,000,000, following an increase in the preceding week of \$40,000,000. The contraction in these loans for the 7 weeks ended July 23 totals \$875,000,000.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended July 23 showed decreases of \$16,000,000 in holdings of discounted bills, of \$18,000,000 in holdings of bills bought in the open market, and of \$1,000,000 in holdings of Government securities. The reserve ratio on July 23 was 83.2 per cent as against 82.0 per cent a week earlier and 81.7 per cent two weeks earlier.

Baltimore Section Completes Program

S. A. E. Group Plans Several Autumn Meetings

BALTIMORE, July 28—Many subjects of importance to the automotive industry will be discussed at the meetings of the Baltimore Section, Society of Automotive Engineers, during the coming season. The program for the year has been mapped out by the executive council, and it will include a wide range of subjects.

Meetings will start on Sept. 24 when "Progress in Lubrication" will be the topic. On Oct. 8 the subject will be "Maintenance According to Methods Recommended by the Bureau of Standards," to be followed on Oct. 29 by "Maintenance According to Methods in Practice."

"Special Service Equipment" will be discussed on Nov. 19. On Dec. 10 the subject will be "Aircraft Engines; Design, Construction and Testing." The subject for Jan. 31 will be "Transmission of Power; Clutches, Gear Boxes and Final Drives." At the meeting on Feb. 6 there will be a talk on "Baltimore Industrial Development and Traffic Control." The subject on March 4 will be "Diesel Engine Types as Applied to Automotive, Marine and Aircraft Uses."

"Brakes, Design and Construction" will be the subject for April 9. The final meeting, May 15, will be devoted to "Truck Characteristics and Relative Capacities."

Murray Reports Profit

DETROIT, July 30—Murray Corp. of America, and subsidiaries, has reported consolidated net profit for the half year to June 30 of \$734,043. Shares outstanding were 769,173. President C. W. Avery in presenting the report to the stockholders remarks as follows: "The financial position of your company is strong. As shown in the balance sheet we have over \$3,000,000 in cash and the ratio of current assets to current liabilities is 8.6 to 1. Our profits for the first quarter of the year were \$295,193, and for the second quarter \$438,849."

De Soto Entering 3rd Year

DETROIT, July 30—The De Soto Motor Corp. and its dealer organization will celebrate the second birthday anniversary of the De Soto car next week. This youngest member of the Chrysler Motors family made its bow to the public on Aug. 4, 1928.

Ceylon Registrations Gain

COLOMBO, June 20—A total of 24,250 motor vehicles were registered and in use in Ceylon on May 31 last, as against 21,986 on the corresponding date of last year and 18,833 on May 31, 1928.

Olds Plant Shut Down

LANSING, July 28—In keeping with the annual vacation policy, all manufacturing operations of the Olds Motor Works and the affiliated plants of the Fisher Body Corporation here were suspended last Saturday, July 26. This permits all factory employees to take their vacations simultaneously. Production is to be resumed Monday, Aug. 11, officials announced.

Reo Reduces Ratio of Operating Loss

DETROIT, July 28—Reo Motor Car Co. reports a net loss for quarter ended June 30, 1930, of \$173,961 after depreciation. The loss before depreciation of \$331,942 was \$157,981. The loss for the quarter is 8.7 cents per share, as compared with an 8.8 cents loss for the first quarter and a profit of 57.4 cents per share for the corresponding quarter of 1929.

In its official statement the company says it has not permitted this anticipated showing to interfere with its plans for materially broadened future activities. Since January 1st more than \$1,000,000 has been expended for new machinery and equipment. It is indicated by a comparison of the statements of the first half of 1930 and the first half of 1929, that engineering, experimental and general development expense has proceeded on a normal basis.

Since William Robert Wilson became general manager several months ago there has been in progress a continuous strengthening of the field staff, both as to numbers and caliber of men.

Cash and marketable securities amount to \$10,304,230 and the relation of current assets to current liabilities is 12.2 to 1.

Dividend checks of 20 cents per share were mailed early this month to the 12,500 Reo stockholders.

Chrysler Holders Increase

DETROIT, July 30—Stockholders of Chrysler Corp. have nearly doubled in number in the 12 months ending June 30, according to a compilation which has just been completed. The total number of stockholders of the corporation at the end of June was 44,459, as compared with 23,688 at mid-year in 1929. Since the first of the year Chrysler stockholders have increased 8340.

Dural Increases Force

TRENTON, N. J., July 30—The Dural Rubber Corp., Flemington, N. J., has placed a night force at work in manufacturing automobile tubes. The company will erect a one-story addition to be used for the storage of tires.

Michigan Sales Drop for June

Ford Takes 57 Per Cent of Month's Business

DETROIT, July 28—New passenger car registrations in the state of Michigan in June totaled 14,867 as compared with 21,076 for May, a loss of 6209. The figure for June shows a loss of 17,213, or more than 53 per cent, compared with 32,080 for June, 1929.

Ford registrations in Michigan last month totaled 8432, a loss of 4351 as compared with 12,783 for June, 1929. The June Ford registrations represent approximately 57 per cent of the registrations of all makes in the state. Chevrolet registrations last month totaled 2463. Plymouth was third on the passenger car list with 512, Essex was fourth with 347, and Olds was fifth with 329.

Total registrations of commercial cars in the state last month were 1412 as compared with 1824 in May, a loss of 412, or slightly more than 22 per cent, and with 2613 in the same month last year, a loss of 1201, or approximately 46 per cent. Ford showed a total of 896, while Chevrolet was second with 288, and International third with 57.

Capacity of Natural Gasoline Plants Gains

WASHINGTON, July 30—There were 1035 natural-gasoline plants in the United States, with a total daily capacity of 10,516,000 gal., on Jan. 1, 1930, according to a survey conducted by the United States Bureau of Mines, Department of Commerce. The last similar survey, that of Jan. 1, 1928, showed a total of 1155 plants of 8,048,000 gal. daily capacity. Thus in two years' time the number of plants has decreased by 120, but the total capacity has increased 2,468,000 gal. or 31 per cent. This is roughly equivalent to the gain in production over the same period. Over half of the increase in total capacity was registered in California.

Kent Opens Another Garage

NEW YORK, July 29—There was opened in mid-Manhattan this week the second of the Kent automatic garages. It will be operated on the pay-as-you-park basis: 50 cents for the first two hours and five cents an hour thereafter for a 24-hour period.

Caterpillar Declares Extra

CHICAGO, July 28—Caterpillar Tractor Co. has declared an extra dividend of 25 cents and the regular quarterly dividend of 75 cents. The company has paid a similar extra dividend for the past three quarters.

Advertising Linage Decreased in June

Loss Was 29 Per Cent,
Compared With 1929

NEW YORK, July 28—A 29 per cent decrease in automotive lineage carried in daily and Sunday newspapers of the United States during the month of June, 1930, is reported by *Editor and Publisher* in its monthly summary. The June, 1930, lineage for daily and Sunday newspapers was 11,939,030 as compared with 17,624,372 lines for June, 1929.

Automotive display lineage in daily newspapers showed a decrease of 2,242,024 lines in June, 1930, as compared with June, 1929. The figures for the two months were 9,042,758 and 11,284,782 agate lines respectively. Sunday lineage decreased 3,443,318 units, comparing the two months. The 1930 June figure was 2,896,272, and that for 1929, 6,339,590.

French Examine 160 Planes

WASHINGTON, July 28—One hundred and sixty new types of airplanes were examined in 1929 in France by the French official commission for the examination of new types of airplanes, according to a report received in the Department of Commerce from Automotive Trade Commissioner W. L. Finger, Paris. Of this number, 52 were military land planes, 66 commercial or racing land planes, 21 military seaplanes and 23 commercial seaplanes. Of the types submitted, only 72 were actually ordered by the government, that is, authorized for construction at government expense. Provisional approval was given to 87 other types.

Thompson Gets P. & W. Order

CLEVELAND, July 28—Thompson Products, Inc., aeronautic division, announces receipt of valve orders from Pratt & Whitney Aircraft Co. during the past month totaling nearly \$100,000. The most recent consignment was for 8500 valves, to be used in motors being built for the Government.

Other orders have also been received from Curtiss Aeroplane & Motor Co., Wright Aeronautical Corp. and Lycoming during July.

Climax Reports Increase

CHICAGO, July 28—Increase of 32 per cent in sales during the first half of July over the comparable period in June is reported by the Climax Engineering Co. of Chicago and Clinton.

Ellis F. Muther Dies

CHICAGO, July 28—Ellis F. Muther, sales manager in charge of Flux Solder division of Gardiner Metal Co., Chicago, died suddenly Sunday morning, July 27, as result of a stroke.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

New York, International Import Trade ExpositionAug. 4-9
Lwow, Poland, Sample FairSeptember
London, England, Olympia Show.....October
Berlin, International Automobile.....Nov. 6-16

CONVENTIONS

Society of Automotive Engineers, Aeronautical, ChicagoAug. 26-28
Fifth International Air Congress, Auspices Royal Aero Club, The Hague, HollandSept. 1-6
Eastern States Exposition, Springfield, Mass.Sept. 14-20
National Safety Council, Annual Safety Congress, Pittsburgh.....Sept. 29-Oct. 4
Sixth International Road Congress, Washington, D. C.Oct. 6-11
Exhibition—American Roadbuilders Association, Washington, D. C.Oct. 6-11
Society of Automotive Engineers, Production, Book-Cadillac Hotel, DetroitOct. 7-8
Society of Automotive Engineers, Transportation, PittsburghOct. 22-24
Motor and Equipment Association, Convention, ClevelandNov. 10-14
N. S. P. A. Convention, Cleveland, Ohio, Nov. 17-21
First International Aerial Safety Congress, Paris, FranceDec. 10-23

SALONS

Chicago, Drake HotelNov. 8-15
New York, Commodore Hotel.....Nov. 30-Dec. 6
Paris, FranceOct. 2-12
Prague, CzechoslovakiaOctober
Paris, France, Salon (Commercial Vehicles)Nov. 13-23
Brussels, Belgium, SalonDec. 6-17

RACES

Italy (Grand Prix)Sept. 7
France (Grand Prix)Sept. 21

Bob Robinson Killed

PHILADELPHIA, July 28—Bob Robinson, racing driver, was killed at the Woodbridge, N. J., half-mile track yesterday when his Miller Special crashed through the rail surrounding the oval. Robinson was trailing Ritz Baker at an estimated 75 m.p.h., when the latter's car blew a tire. In swerving to avoid collision, Robinson ricocheted off Baker's car and hurtled through the rail. Fred Frame, Philadelphia, won the race, a 50-mile event, for a purse of \$500.

Chevrolet Gives Wheel Option

DETROIT, July 28—The Chevrolet Motor Co. announced today that wire or disk wheels are now optional equipment on its passenger cars. The option of wire or disk wheels went into effect as of Aug. 1. Dealers with cars having only disk wheels at that time will be supplied with sets of new wire wheels to make the change-over for those purchasers desiring it.

Thompson Earns \$1.47

CLEVELAND, July 28—Thompson Products, Inc., large automotive parts concern, reports a net profit of \$399,036 for six months ended June 30, 1930, equivalent to \$1.47 a common share, after deduction for dividends on preferred stock outstanding. Dividend rate on the common is 60 cents quarterly.

Automotive Employment Below December Figure

Michigan Report Shows
Increase in Payrolls

DETROIT, July 28—In the automobile industry in the state of Michigan as of June 15 there were 194,175 employees, a decrease of 1221 over the total of 195,396 for December, according to a report by the State Department of Labor and Industry, based on reports of 52 companies.

The aggregate weekly payroll for the automobile industry in the state was \$6,187,143 as compared with \$7,133,214 in May and \$5,068,002 in December. Average weekly earnings per capita in the automobile industry were \$31.86 in June, \$34.14 in May and \$25.94 in December.

Dodge Transfers Two

DETROIT, July 28—Two changes in Dodge Brothers field organization executive personnel were announced last week by A. van Der Zee, general sales manager. Guy H. Peasley, formerly for more than a year a special representative of the factory sales department, has been named district manager in the Omaha district. Mr. Peasley has had a long and diversified experience in the motor car industry.

C. B. Warner, formerly Omaha district manager, has been transferred to Philadelphia as district manager at that point, succeeding Hanson Robinson, resigned. Mr. Warner has been associated with Dodge Brothers field sales organization for a number of years.

Perfect Circle Earns \$2.62

CHICAGO, July 26—The Perfect Circle Co. for the six months ended June 30 reports a net income of \$368,057, after all charges including Federal taxes, equal to \$2.62 a share on the 162,500 shares of stock outstanding. This compares with \$495,704, or \$3.05 a share, on the same capitalization in the 1929 period. Although net profits are 25 per cent under the first half of 1929, C. N. Teetor, president, states he is well pleased with the company's showing.

USL Revises Battery Line

NIAGARA FALLS, N. Y.—July 28 The USL Battery Corp. has announced a complete revision of their line of batteries for bus and truck service. Sixteen 12-volt and 16 6-volt battery types are included in the new USL line.

Graham Adds 575 Dealers

DETROIT, July 28—Since the first of the year the Graham-Paige Motors Corp. has added 575 new dealers, according to F. R. Valpoy, general sales manager of the company.